INDIAN FOOD INDUSTRY

VOLUME 15
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MARCH/
APRIL

A PUBLICATION OF ASSOCIATION OF FOOD SCIENTISTS AND TECHNOLOGISTS (INDIA)

ESTIMATING MARKET POTENTIAL

Tea - A Refreshing Beverage

Further Processed Poultry Meat Products

A Modified Buchner Funnel

Bar Coding

ASSOCIATION OF FOOD SCIENTISTS AND TECHNOLOGISTS (INDIA) MYSORE - 570 013

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* Affiliated to the Institute of Food Technologists, Chicago, Illinois, U.S.A.
* The Association is a professional and educational organization of Food Scientists and Technologists, with its headquarters at Mysore.
* The chapters of the Association the association are located at Bangalore, Bhopal, Bombay, Calcutta, Delhi, Hisar, Hyderabad, Jabalpur, Jaipur, Jammu, Kanpur, Karnal, Kharagpur, Ludhiana, Madras, Manipur, Nagpur, Pantnagar, Parbhani, Pune and Thiruvananthapuram.

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* Advancement of all the aspects of Science and Technology relating to production, processing and distribution of food, with the ultimate objective to serve humanity through better food.
* Promotion of research, development and training in the Science, Technology and Engineering of Food.
* To provide a forum for exchange, discussion and dissemination of knowledge and current developments, especially among Food Scientists and Technologists as well as the Public and Society at large.

Major activities :

* Publication of 'Journal of Food Science and Technology' (bi- monthly) and 'Indian Food Industry' (bi-monthly),
* Holding symposia/conventions on different aspects of Food Science, Technology and Engineering
* Arranging Lectures and Seminars for the benefit of Members and the Public.

Membership :

* Membership is open to graduates and diploma holders in Food Science, Technology and Engineering as well as to those engaged in these professional activities.
* Types of membership include Life Member, Life Member (Resident Abroad), Corporate Members, Full Member, Member (Resident Abroad), Affiliate Member, Student Member and Student Member (Abroad).
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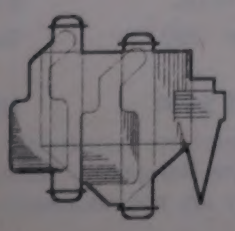

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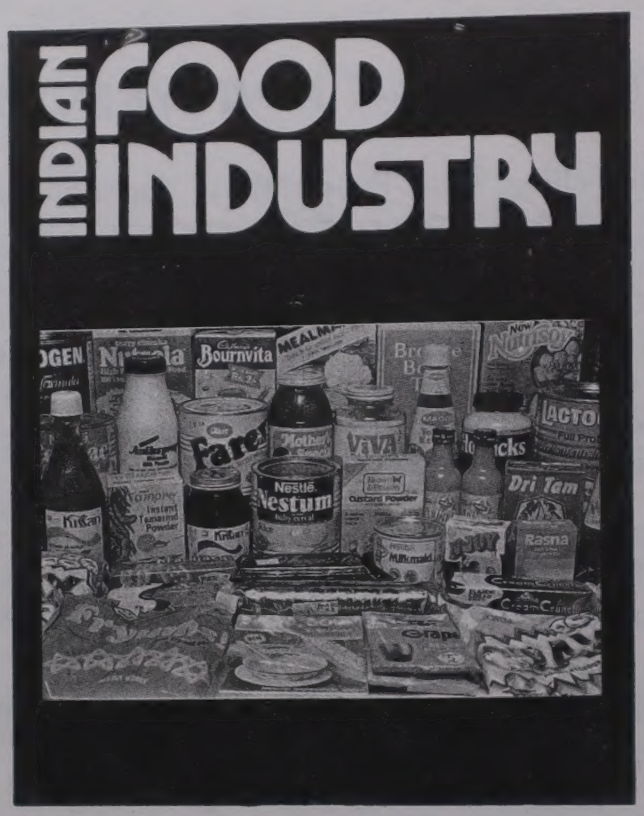

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Review articles, technology papers based on R&D work and reports on various aspects concerning food industry are welcome from food scientists and technologists from industry, research institutions and other related organisations. Contributors are advised to provide good quality illustrations in the form of charts and photographs along with the manuscripts. The Editorial Board reserves the right to edit the manuscripts in order to make them suitable for publication in the journal.

Food industries may send information (suitably illustrated with photographs) about their new products, machinery, business ventures and other developments, which will be published on the discretion of the Editorial Board.

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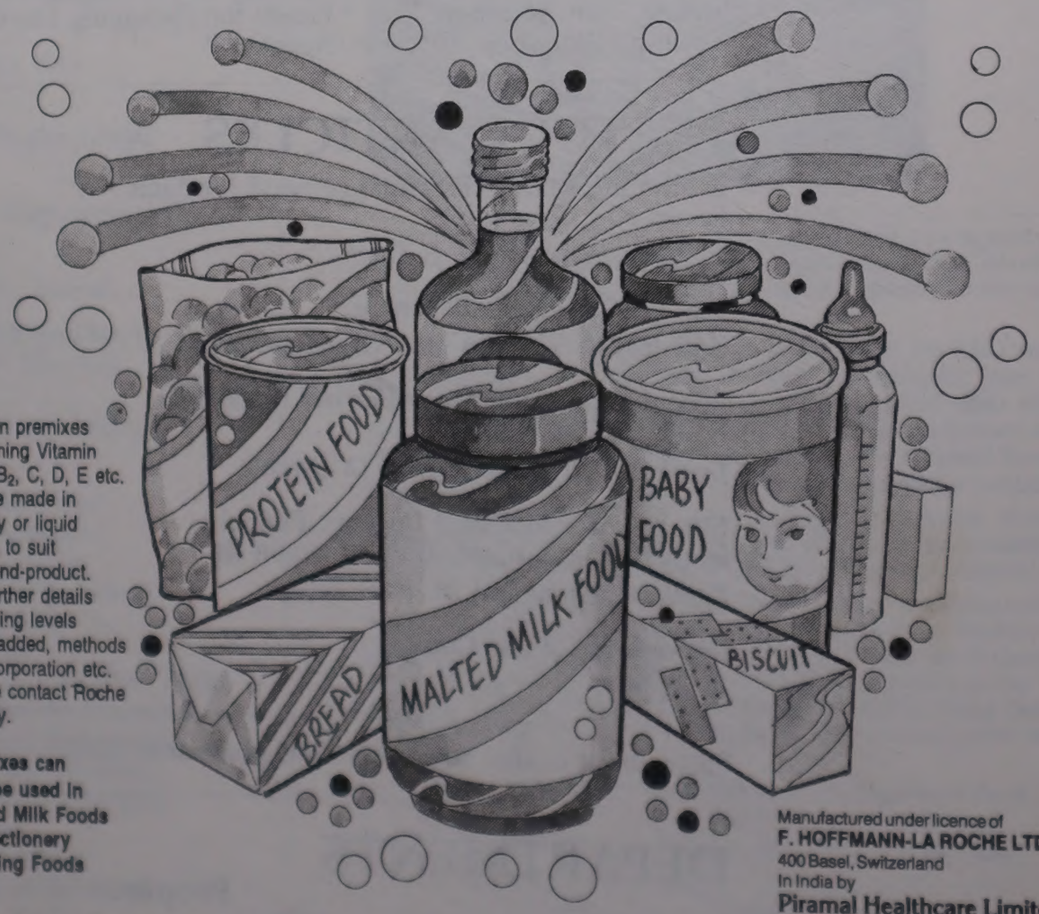

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INDUSTRY NEWS

Food Processing : A Steady Growth

The Ministry of Food Processing Industries showed considerable progress in the food processing industry in 1995. The growth rate of the industry went up to 24 per cent from 21 per cent last year. The Government encouraged investment in non-urban areas to give a rural slant to the reforms process. The total investment in this area exceeded Rs. 47,000 crores.

Of the Rs. 42,343 crore worth entrepreneurs' memoranda signed. Rs. 36,764 crores were for rural areas. Similarly, in the areas where Government approval was needed, proposals worth Rs. 9,028 crores were for rural areas.

Work began on around 454 projects, envisaging an investment of Rs. 5,481 crores and direct employment of around 62 per cent during the year. Work also began on 87 projects with a total investment of Rs. 1,704 crores, including foreign participation worth Rs. 973 crores.

Processed food export, which netted Rs. 6,077 crores, is expected to be Rs. 7,500 crores by the end of the financial year according to official estimates.

The concept of contract farming found wide acceptance, with 10 more companies entering the area to help farmers in remote and backward areas.

To encourage small-scale agro-processing units, the Ministry helped State Governments establish 22 food processing centres during the year, taking the total number to 162.

Regent Agro to Launch Coco Sip

Hyderabad-based Regent Agro Products Ltd will market coconut water in tetra packs. Called 'Coco Sip', the 250 ml tetra drink is competitively priced at Rs 6 with other fruit and soft drinks. The company will also launch coconut milk as a fun beverage and a food additive.

In contrast to fresh coconut water which starts fermenting within hours, the aseptically treated coconut water packaged in tetrabrik packs retains its nutritional value and has a shelf life of six months without refrigeration, claims the company.

Regent Agro Products will introduce a range of value added processed coconut products including coconut milk, coconut oil, shell powder, desiccated coconut powder, fibre and coir using the wet processing technology.

The company plans to set up another plant in Tamil Nadu during 1997, which will have a capacity to process 75 million coconuts.

Regent Agro Products is sourcing the processing and packaging technology from Alfa Laval (India) Ltd, which has a tie-up with $ 1.16 billion Swedish international major in liquid food packaging technology, Tetra Pak.

The processing technology was first developed in late eighties in Singapore by Alfa Laval for processing coconut cream and coconut milk and was well received in the South East Asian markets like Indonesia and Philippines. Tetra Pak's other Indian clients include Parle (Frooti) and Godrej (Jumpin Mango and Tomato Puree).

Tetra Pak will also provide marketing support to Regent Agro Products Ltd.

Mapro Foods to Expand Product Line Operations

The Mahabaleshwar-based Mapro Foods Ltd has undertaken an expansion-cum-diversification plan to expand its existing product line and tap potential areas in the food processing industry.

The company, known for its range of fruit-based jams, crushes and syrups in Maharashtra, also aims to extend its geographical area of operation to grab a larger chunk of the market for processed foods in major urban centres according to Mr. Dhanesh Gupte, Manager, Sales and Marketing.

Mapro, one of the first players to set up shop at Mahabaleshwar in Satara district, is gearing up to enter the fruit-based confectionery segment. The details are being worked out. The company is also considering an entry into

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the chocolate segment, said Mr. Gupte.

Mapro Foods will also shortly enter the frozen foods segment with frozen strawberry pulp to begin with, Mr. Gupte said. The line would later be extended to include mango, custard apple and other popular pulps in the second phase of operations. A cold storage with 40 tonnes capacity is already in place at the manufacturing facilities off Panchgani and the company plans to target both the retail and institutional buyers with the products.

EoU for Coconut Processing

Goa Fruit Specialities is setting up a 100 per cent export oriented project near Panjim for the manufacture of coconut cream and fruit pulp with a capacity of 18,000 tonnes annually. The company will process various fruits such as mangoes, pineapples, guavas and bananas into pulps besides coconut cream which will be the main product.

Coconut cream and fruit pulps are in good demand from fruit juice manufacturers, ice cream and chocolate industries. Coconut cream is also used for daily consumption by South Indians living abroad.

The company has been promoted by Mr. J. M. Chawla who has rich experience in finance, real estate and corporate affairs as a promoter of Rockland Leasing, a listed company. He has also promoted two other companies - Rockland Thermionics and Goa Plantations.

Rockland Thermionics is engaged in the manufacture of mild welding electrodes at its plant in U.P.

Goa Plantation has a large number of matured trees of coconut, cashewnuts, rubber, arecanut and mango in its 150 acre farm. It proposes to acquire an additional 1,000 acres in Goa, Karnataka and Tamil Nadu, where it will enter into horticulture business. It has also plans to export cash crops such as coffee and cardamom.

Goa Fruit Specialities will adopt a technology to process coconuts similar to the one followed in South Asian countries. The technology will be provided by Gadekar and Associates (Pvt.) Ltd. The plant and machinery have been ordered from the U.S., France and Italy. Commercial production is slated for March 1996.

The company has tied-up with Global Foods Trading of Germany for marketing 50 per cent of its production and 25 per cent with JTA Merchants Corporation of South Africa. Negotiations are on with other U.S. companies.

The cost of the project is Rs. 11.72 crores which will be met by promoters' equity of Rs. 4.78 crores, public issue of Rs. 6.68 crores and a subsidy of Rs. 25 lakhs.

Capsein Bio-Lab to Get US Knowhow on Extrusion of Natural Colours

Capsein Bio-Lab Ltd is setting up a project near Madras to manufacture natural colours.

The company has entered into an agreement with the US-based Super Critical Technology Consultants for the supply of technology.

The plant, to be set up in Madurantakam taluk, will extract natural colours from botanicals such as leaves, flowers, fruits, seeds and rhizomes.

It will adopt super critical fluid extraction (SCFE) technology, which uses liquefied carbon dioxide at high pressure for the isolation of colours and other extractables.

The company will begin production in June 1996 with turmeric as the raw material. At a later stage, it will use grapes to obtain red and blue colours and flowers from the gardenias and hibiscus families to obtain colours to be used in the food processing, textile, and cosmetics industry.

The company plans to export almost the entire capacity of one tonne a day. Mr. J. Laxminarayanan, CMD, said that the company would sign an MoU with Super Critical Technology Consultants to market their products.

The company will start with wholesale manufacture of pure pigments and later manufacture formulations.

One kg of natural pigment extracted from turmeric will cost Rs. 5,000, while the same quantity of synthetic pigment costs around Rs. 2,000. The phasing out of synthetic dyes is only a matter of time.

Capsein will encapsulate downstream products such as oleoresins, which are flavouring agents obtained at lower pressures. The encapsulation process, which preserves flavours in perfumes and foods, will not require additional investment in equipment.

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Jagadale Group to Enter Sports Nutrition

The Rs. 100-crore N. R. Jagadale (NRJ) group, based in Bangalore, is diversifying health food for athletes. Search India Pvt Ltd, a two-year-old NRJ group company, is negotiating with a US company to set up a joint venture for the software development, according to its Vice-president, (Projects), Mr. T. D. Vijayaraghavan.

While the terms of the joint venture are still under discussion, the project is estimated to cost around Rs. 6-7 crores.

In the nutritional foods segment, Search India is planning to launch sports nutrition products. This will be the first launch of a specialized food product for sportspersons in the country.

Experiments have been carried out on athletes and Power Plus, a cholesterol-free egg powder with 73-75 per cent protein content has been tested successfully. It is proposed to be launched this financial year. The investment in Power Plus is Rs. 5 crores. The plant has been set up in Bangalore.

The company is working closely with the Sports Authority of India to test its products. Currently, clinical tests are being carried out with the help of doctors to certify Carbo Plus, a high carbohydrate supplement. Carbo Plus is also recommended for convalescing patients and is expected to be launched during the next financial year. The company plans to invest around Rs. 2 crores in the product.

Salem Tapioca Cultivators in Crisis

About one lakh farmers engaged in tapioca cultivating in Salem district of Tamil Nadu remain shell-shocked and driven to despair, as there has been an inordinate delay in payment from the factory owners.

The tapioca industry is backbone of the agrarian economy of Salem and Dharmapuri districts. Salem district accounts for 85 per cent of the total tapioca and starch production in the country, with more than 40,000 hectares under the crop. Its average yield is 30 tonnes per hectare and in some hilly region, it touches as much as 45 tonnes, which is the highest yield in the world, with Thailand coming next, yielding 14 to 16 tonnes. Salem district has more than 860 tapioca-processing units and transacts more than 85 per cent of the total tapioca products of sago and starch.

On an average, the district produces 71,100 tonnes of sago and 75,000 tonnes of starch per annum.

The Salem District Starch and Sago Manufacturers Service Industrial Co-operative Society (Sago, Serve) alone has an annual turnover of Rs 120 crores.

HSIDC's Mush-room Projects

The Haryana State Industrial Development Corporation (HSIDC) would be setting up 100 per cent export-oriented mushroom processing projects at Sohana near Gurgaon and Gannaur near Sonipat under its assisted sector scheme. Two memoranda of understanding were signed to this effect recently. Both the projects are being appraised by the National Bank for Agriculture and Rural Development (NABARD). HSIDC shall be contributing Rs 116.77 lakhs in the equity of these projects.

New Fiscal Incentives to Promote R&D

The Government has announced fresh fiscal incentives for promoting research and development in industry.

According to the Minister of State for Non-conventional Energy, Prof. P. J. Kurien, the Government would consider providing grant up to 50 per cent of the total cost of research and development efforts undertaken by institutions or industry in the field renewable energy technologies, provided this would result in commercialization of the technology within a period of three years.

The Government has also decided to provide up to 50 per cent financial support to research and development projects undertaken by profit making industries registered with the Department of Scientific and Industrial Research (DSIR).

Emphasis would be given to projects which would result in the development of indigenous technologies, development of new products, improvement of efficiencies, reduction in cost of existing products, systems, devices and components.

The research and development scheme aims at forging strong linkages between the Government, the research and development institutions and industries and also to make

Indian renewable energy technologies competitive in national and international markets.

Tarai Foods to Launch Frozen French Fries

Tarai Foods Ltd is launching 'Inland Valley' frozen French fries, which will be introduced in Chandigarh soon.

'According to Mr. Rajiv Goyal, Vice-president, Tarai Foods Ltd, Tarai's technology takes out some amount of starch from the potatoes to make them crisp when fired. This product will be available in many sizes and will cost about Rs. 60 per kg.

To ensure regular supply of quality potatoes, Tarai Foods plans to enter into agreements with larger farmers in the Rudrapur region of Uttar Pradesh. It is negotiating with Lambweston of the US, a frozen food major for a tie-up.

MPEDA to Focus on Value-added Seafood

The Marine Products Export Development Authority (MPEDA) is concentrating on the concept of value-addition with a policy support to upgrade the processing equipment and producing seafood in value-added IQI form. For this purpose, the MPEDA is assisted by over 70 processing units.

The transition to this line of activity has been motivated to meet current demands in major markets, particularly Western Europe. There is tremendous scope for value-addition/ diversification of shrimp products in the export basket since they are accepted as inherently healthy, dietary and environmentally safe in developed countries.

Seafood Export Exceeds $ 1 billion

For the first time, seafood export from the country has exceeded $ 1 billion. Against a target of Rs. 3,120 crores set for 1994- 95, export worth Rs. 3,270 crores was achieved. This was mainly due to higher contribution from prawn aquaculture, increasing demand from world over, a stable exchange rate and higher unit value. The major items of exports were frozen shrimp, frozen fish, frozen squid and frozen cuttle fish.

There also exists scope for exporting non-shrimp products in value-added form. With the liberalized fishing policy, the country could increase production by employing diversified fishing methods for unexploited shrimp resources.

Cadbury Schweppes Names Distribution Franchise for Canned Drinks

Cadbury Scheweppes, the UK-based soft drinks major, has entered into a franchise agreement with Delhi-based Rajasthan Breweries for the Schweppes' range of canned drinks.

Under the arrangement, Rajasthan Breweries, the maker of Stroh's beer, will use its can filling line at Alwar in Rajasthan for the Schweppes products. It will also set up a nationwide distribution chain for the soft drink company.

Large Integrated Dairy Coming up in Baramati

A Bombay-based company is setting up one of the largest integrated dairy plants in the private sector in Baramati. Billed as the only plant in Asia capable of producing cheese, lactose, casein, milk powder, ghee and butter in a single facility, the Dynamic Milk and Food Industries plant will use cow milk to produce a range of products for the export markets.

The Rs. 116 crore project is in technical collaboration with three multinational companies with Valio of Finland providing the technology for the lactose plant, Demro of USA providing design and machinery for the cheese plant and Shryber of USA providing technology as well its brand name for the export of casein.

One of the special features of the project is that it has sought to integrate the plant into the existing dairy cooperative set-up in Maharashtra. The Dynamic plant will have the capacity to process six lakh litres of milk per day, which will be supplied through the cooperatives operating in Baramati.

This area produces ten lakh litres surplus milk every day, for which there are no processing facilities. The company's arrangement with the

cooperatives is such that the milk will be chilled within 45 minutes from milking.

To be able to do this, the company is importing milk collection equipment from France, which will be installed in 150 locations around a 80 km periphery around its procurement area. It is also setting up support services for farmers, in the form of a demonstration farm, with 250 high breed imported cows, artificial insemination and veterinary facilities.

Confectionery Items

Swiss health Food Pvt Ltd has introduced, in collaboration with Choco-Tec Corporation, Switzerland, arrange of world class confectionery items including candies, toffees and chocolates under the brand name Swisz. The range is available in attractive designs and packings. The company also offers various types of industrial chocolates and cocoa powder.

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Coke, Fanta in PET bottles

Coca-Cola India has launched Coke and Fanta brands in new packages. Both drinks will now be available in 1.5-litre PET (Polyethylene Terephthalate) bottles.

Initially, the newly packaged products will be available in Mumbai. The company is planning to launch the PET bottles in other metro cities as well.

Priced at Rs. 35 per bottle, the soft drinks are being bottled at a blowing and in-line filling plant at Pune at a bottling speed of 7,200 bottles, making it the fastest bottling plant in the country. The new packaging is the second launch in the new year with Coca-Cola unveiling 330-millilitre can packs for both soft- drinks in January.

According to Coke officials, the PET bottle will also be used in the Coca-Cola-On-The-Go portable backpack dispensers for vending 300-millilitre servings to the consumers at the cricket stadiums. The light-weight PET bottles will be supplied to retailers in a corrugated packing of 12 bottles a case. This is in sharp contrast to the traditional 24-bottle case used by the company for its other bottle packaging.

Ganesh Benzoplast Diversifies

Ganesh Benzoplast Ltd (GBL), which is engaged in the manufacture of benzoate plasticizers, benzoic acid and sodium benzoate, is diversifying into the manufacture of refined iodized salt and other marine-based chemicals. The company is also expanding the capacity of its liquid chemical storage facilities at JNPT, and Nhava Sheva, Mumbai. The project is estimated to cost about Rs. 198 crores. The company which has a total capacity of 3,600 tonnes of sodium benzoate and benzoic acid, is raising the capacity to 7,200 tonnes per annum. Its iodised salt manufacturing unit will have a capacity of 3.6 lakh tonnes per annum. The project will also manufacture 300 tonnes of bromine, 100 tonnes of isopropyl and 1,500 tonnes of magnesium chloride from bittern.

Alfa Laval Licensed to Make Packing Material

Alfa Laval, a subsidiary of the $8 billion Swedish packaging giant, Tetra Laval, has been granted a licence to manufacture creased laminated packaging material. Following this development, the foundation for the company's Rs. 280 crores plant at Vadgaon, near Pune, was laid early last year, by the President and Chief Executive Officer of Tetra Laval Worldwide, Dr. Lars Hallden. The plant will manufacture and market created laminated paper for making drink-bottle tetrapaks.

Cadbury India to Give Bournvita a Face-lift

Cadbury India is relaunching its chocolate drink branded Bournvita after a period of nearly four years. The launch will be marked by a new advertising campaign by Oglivy & Mather.

The relaunched Bournvita would go national by the end of the year. Speaking to FENS, Rajeev Bakshi, Vice-president - Marketing & Sales, Cadbury India, said that the relaunched product will have new packaging and advertising.

There will be no difference in the product taste and quality, except that it will be loaded with added nutrients. As earlier, the product will be targetted at children.

Cadbury India is expanding its total capacity of 10,000 tonnes per annum at its Malanpur plant in Madhya Pradesh to 15,000 tonnes per annum.

The move has been initiated in the wake of Cadbury's plans to introduce new products in the chocolate segment of confectioneries by next year, in which the company will be investing around Rs. 20 crores.

Besides, Cadbury has also evinced keen interest to enter the sugar confectionery market for which the company has lost the bid for acquiring sugar confectionery company 'Nutrine'.

NIN Notes Greater Usage of Non-permitted Food Colours

A survey during 1993-94 undertaken by National Institute of Nutrition indicates that an increasing number of food items in India are containing non-permitted food colours that can cause a wide range of adverse reactions.

Most of the food-borne diseases reported are due to consumption of non-permitted textile colours or abuse of colours, reports the National Institute of Nutrition (NIN), Hyderabad.

Food colours, natural or artificial, can induce adverse reactions in sensitive persons, NIN's report in the *Indian Journal of Medical Research* says.

Analysis of samples of sweets and confectioneries collected during festivals in 1993-94 in the twin cities of Hyderabad and Secunderabad confirmed wide use of non-permitted colours. Major adulterants in confectioneries were non-permitted colours such as mentanil yellow, orange II and rhodamine B.

The permitted synthetic food colours in India include carmoisine, erythrosine and ponceau 4R (all red in colour), sunset yellow and tartrazine (yellow), brilliant blue and indigo carmine (blue).

The survey indicates that synthetic colours like Sudan dye are major adulterants in edible oils.

Synthetic colours such as mentanil yellow, Sudan IV and lead chromate were detected in turmeric powder, while tartrazine and mentanil yellow are reported in pulse and pulse products.

In non-alcoholic beverages such as tea and coffee, sunset yellow carmoisine, tartrazine, brilliant blue and mentanil yellow were found.

Another NIN survey showed that five per cent of the samples tested contained orange II, 41 per cent rhodamine, 30 per cent auramine and 24 per cent of the samples had a combination of rhodamine and auramine.

The most frequently used non-permitted food colour is mentanil yellow, which causes abnormalities in haemoglobin - the iron containing protein in red blood cells-eventually leading to insufficient oxygen supply to the tissues.

Food containing lead chromate caused vomiting and diarrhoea in several persons, while some women were reported to have developed severe allergic reactions after consuming foods with carmine-a natural dye extracted from a group of insects.

Similarly, tartrazine-a permitted food colour, has been reported to cause irritability, restlessness and sleep disturbances in some children.

Other permitted food colours such as amaranth, sunset yellow and ponceau have been linked to patients with chronic skin allergy.

The NIN report says that food colours often react with proteins and carbohydrates in foods-for example, some colours such as erythrosine, orange II and rhodamine B at the concentrations, added in food, harm carbohydrate digestion.

Similarly, rhodamine B, amaranth, indigo carmine and tartrazine have been reported to affect enzyme activity.

Studies at NIN have shown that amaranth, tartrazine and erythrosine react with mineral ions such as copper, iron and zinc in foods, affecting their absorption in the small intestines and leading to deficiency-linked disorders.

Experiments on animals at the NIN have also shown that tartrazine and mentanil yellow reduce levels of vitamins A and E.

Usually, the toxic effects of permitted synthetic colours are observed at very high levels of intake not normally seen in daily diets.

The government is pressurized periodically to place a total ban on the use of food colours due to their possible ill-effects.

However, any legal action should be accompanied by proper surveillance, the report cautions.

To implement food laws successfully, the government has to take some mandatory

precautions such as stopping the use of synthetic colours that have not been categorically proven to be non-toxic, replacing synthetic colours with natural colours after safety evaluation, constant monitoring of possible ill-effects of food colours, and educating manufacturers and consumers about the dangers of non-permitted food colours.

Financial Aid for Product Promotion

Government of India has approved a proposal of Spices Board to introduce a Scheme for providing financial assistance to the exporters of spices in consumer packs for product promotion and test marketing in overseas markets. The scheme is intended to provide assistance to the tune of Rs. 5 lakhs or 50% of the total cost of product promotion in overseas markets whichever is less, as grant. The exporters who intend to avail of the assistance shall submit a comprehensive proposal with cost estimates for individual component, for consideration and approval of the Board. The assistance of 50% of the cost shall be used for purposes such as test marketing, product promotion, instore promotion, rent for shelf space, participation in overseas fair by the exporter etc.,

Details and other modalities of the Scheme, can be had from the Marketing Section of Spices Board, Cochin - 25.

Financial Aid for Quality Improvement

The Spices Board is now implementing Quality Improvement Schemes for the registered exporters of Spices.

1. Financial assistance for setting up/upgradation of quality testing laboratory (up to Rs. 1 lakh)

2. Financial assistance for setting up facilities for monitoring pesticide residues in spices/spice products. (up to Rs. 2 lakhs)

3. Financial assistance for adoption of ISO-9000 quality system in spice units (up to Rs. 2 lakhs)

Details of the schemes, terms and conditions and application forms can be had from Spices Board on request. All the above schemes are to encourage spices exporters to acquire facilities for quality assurance and to equip themselves to meet the stringent quality standards imposed by the buying countries.

VSK Extrusions Ties up with Skanem Skive

Sknem Skive AS of Denmark, one of the leading companies in the world, manufacturing aluminium cans for food packaging has tied up with the Bangalore-based VSK Extrusions (P) Ltd for marketing their entire range of products.

According to C.M. Thomas, Managing Director, VSK Extrusions, these Norwegian aluminium packaging cans, used for all forms of hermetically packed food especially fish, meat, vegetables, are specially coated to ensure maximum resistance to mechanical action and chemical effects, will now be available in India.

These cans can meet the most stringent of FDA specifications and other standards worldwide. This collaboration will help the sea food exports and processed food exports from India significantly.

Mr Thomas also said that the company was close to concluding an agreement with a leading international seaming machine company, to provide a complete canning solution to clients.

Funds for Packaging Development, Bar Coding

The Union Government has sanctioned a scheme for providing Financial Assistance for Packaging Development and Bar Coding Registration during 1995-96 and 1996-97. The Assistance is limited to 50 per cent of the actual cost for Packaging Development/Bar Coding Registration or Rs. 2 lakhs, whichever is less.

Exporters of consumer packed spices whose brands are registered with the board or registered exporters who intend to introduce a new brand for exports are eligible to avail of the assistance. Exporters can avail services of CFTRI, IIP or any other consultant for design/development of packs.

For more details about the scheme and application format, please write to the Spices board immediately. The scheme is under implementation from 1995-96 onwards.

Plight of Turmeric Exporters

Turmeric exports are expected to be adversely affected, if the Forward Markets Commission (FMC) fails to take an immediate decision on continuation of the hedging system beyond the December contract.

The spices board has set an export target for turmeric at 30,000 tonnes valued at Rs 45 crores for the current year against estimated exports of 28,080 tonnes valued at Rs 44.51 crores in 1994-95.

Apparently, on the basis of the past export performance, the target is not that ambitious, but it may not be achieved if the facility of hedging could not be resumed soon. The exporters of this commodity are so used to availing of this facility that they really feel its absence.

The export performance so far during the current year is not very encouraging and if the present situation of no hedge trading is allowed to continue for long, it is likely to further affect exports. Actual exports during the first seven months of 1995 (April-October) are estimated at only 14,300 tonnes valued at Rs. 22,48 crores as against 19,180 tonnes valued at Rs 30.20 crores during the corresponding period of 1994.

The controversy had surfaced when the bull operators in the market insisted for fixation of spot rates on the basis of 'Rajapuri' quality. However, the exchange continued to fix rates for Nizamabad variety under the pretext of its larger availability.

According to a leading trader, 'Nizambad quality' was largely accepted under hedge contracts'. Under the exchange by-laws, spot market rate has been defined as the ready rate for the day.

REVISION OF AFST(I) MEMBERSHIP FEE

The SGBM of AFST(I) held on 16/3/1996 has passed a resolution that the following revised rates for membership fee for different categories of Indian and Foreign members w.e.f. 1/4/1996.

		Indian (in Rs.)	Foreign (in US $)
1.	Permanent Donor (Life Corporate Member)	20,000	2,000
2.	Corporate Member	2,000	250
3.	Life Member	1,000	600
4.	Full Member	100	75
5.	Affiliate Member	200	75
6.	Student Member	50	50
7.	Admission fee	25	5
8.	Additional subscription for 2nd journal	150	50

Please note the membership fee be collected accordingly and difference of the fee paid earlier for 1996-97 may also be collected.

P.C.S. Nambiar
Hony. Exec. Secretary

FEATURE ARTICLES

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Estimating Market Potential of Food Products - Issues and Constraints

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Abstract

The market potential is an important input in market planning to realise the untapped marketing opportunities. Consumer research studies on a number of food products, presented in this paper, have led to identification of a number of variables ranging from income and age to linguistic groups which explain differences in consumption patterns across individuals and households. However, identification of such variables, though relevant for marketing practitioners, loses utility in projecting marketing potential in the absence of secondary data on population break-up, based on such variables. It seems that market researchers will continue to work with imperfect information till population classification, based on desired parameters, relevant to market research becomes available on regular basis through census and other data sources. This paper makes some suggestions in this regard.

Introduction

Estimation of market potential is an important tool in market planning. The market potential can help the marketer to assess unrealised opportunities which exist in the market, allocate marketing effort and resources across markets and forecast likely sales of new products. Schendel (1974) rightly pointed out that "one of the most difficult aspects of allocating marketing effort between geographic markets, products or components of a marketing mix is determining how much is to be gained from a given market, or from a particular product or in response to one or more elements of the marketing mix". He further stated that "without some knowledge of the demand response possible, the decision to allocate marketing effort and dollars must be made blindly and probably inefficiently".

The market potential can help the marketer to assess unrealised opportunities which exist in the market, allocate marketing effort and resources across markets and forecast likely sales of new products.

Little research attempt seems to have been made in the recent past in standardization of methodology of estimating marketing potential because of voluminous and complex data requirements. The exercise becomes much more complicated when comes to food products - given the number of products, rapid rate of introduction of new products and wide variation in consumer preferences. Secondly, very few companies in food products are interested in the total national market. Most companies operate with a different product-mix areas of operation and type of business which obviously would require different data sets each time in estimating market potential. In view of these problems, food product companies generally prefer to use direct forecast of sales rather than derived forecast i.e., by first estimating marketing potential and then deciding market share which they can achieve. The later approach offers information on many other dimensions like segmentation, product positioning etc. which can be of immense value to a market in achieving the projected market potential.

While conducting market research on a number of food products - both established and new - we have been repeatedly asked to answer one question "what is the market potential of this product" in a particular metropolis or a geographic area. Based on our attempts to find an answer to this question, the present paper raises relevant issues and constraints in estimating marketing potential both in terms of data requirements and methods of analysis.

The paper has been divided into five major sections. Viz., (i) Market potential (ii) Conceptual framework (iii) Operationalising problems (iv) Discussion and (v) Conclusion.

Market Potential - Definition

Market potential has been defined as "the limit approached by market demand as industry marketing effort goes to infinity, for a given environment" (Kotler 1980). Green and Tull (1978), however, made a small distinction between 'market potential' and 'industry sales forecast'. According to them, market potential is sometimes understood as "the amount of a product service that could be absorbed by the market during a specified period under optimum conditions of market development" while industry sales forecast means "the amount of a product or service that will be absorbed by the market in a specified period of time". However, they also clarified that the terms 'market potential' and 'industry sales forecast' will have the same meaning unless otherwise specified. On the other hand, King (1974) mentioned that one of the most important interpretation of market potential is "the total amount of a product or product class which would be sold to a market in a specified time period and under given set of conditions". However, Cowan (1958) gave an exhaustive list of nine interpretations of the term 'market potential'.

For the purpose of this study, we have adopted the definition proposed by Schendel (1974) who defined "marketing potential as the maximum demand response possible for a given group of customers within a well-defined geographic area for a given product or service over a specified period of time under well-defined competitive and environmental conditions". In our opinion, this is probably the most comprehensive and clear definition of market potential. In other words, market potential is the maximum demand response within given limits of area, time and competitive condition. A change in any one of these limits will mean change in market potential.

Market potential has been defined as "the limit approached by market demand as industry marketing effort goes to infinity, for a given environment".

Empirical Findings

Number of studies have been conducted by Institute of Rural Management, Anand (IRMA) concerning various marketing potential. Lately, with markets becoming more competitive in foods, the issue of market potential has become central both to the introduction of new markets or expanding markets of existing products. The results of some of the studies where the focus was not really on estimation of market potential but some other marketing issues are presented in Table-1.

The studies have used a prior segmentation approach based on demographics such as household, income, expenditure, occupation, education, age, linguistic group (mother tongue) etc. It must be pointed out that classificatory variables used in these studies varied in number and width of categories used with regard to each classificatory variables. At the same time, in most of the cases, data analysis was given only a descriptive treatment with the use of only percentages and means to compare usage (quantum or frequency of use) of food products between respondent categories (based on various demographic variables).

.On the other hand, some other studies gave comparatively more clearer understanding of demographic variables on consumption pattern.

Estimating Marketing Potential - Conceptual Framework

Based on our analysis and interpretation of the results presented above and number of such other studies carried by IRMA, we attempted to develop a conceptual framework for use of demographic variables in estimation of market potential. We felt that given a wide range of products available now or likely to be available in the near future in the market, it will be appropriate to define linkages between the product category and demographic variable. It was expected that such a framework will enhance the potential of replicability of market potential estimation

Table 1. Association between Demographic Variables and Consumption / Purchase Intentions of Food Products

Product	Location	Year	Research	Sample design size	Demographic variable associated with variation in consumption
UHT Milk	Bombay	1991	Consumer survey	300	Income
Ice-cream	New Delhi	1991	Consumer survey	200	Income, Age
Edible oil	Bombay Ahmedabad	1992	Consumer survey	600	600 Income, linguistic group
Frozen Mango pulp	New Delhi	1991	Product test and buying intentions	150	Income, Age
Amul extruded protein food (snack category)	Ahmedabad Surat	1991	Product test and buying price response trends	150	Income
Amul Shrikhand	New Delhi	1992	Product test and buying intentions	600	Income, Linguistic
Ice-Cream	Calcutta	1994	Consumer Survey	380	Expenditure, Age
Butter milk	Ahmedabad	1994	Consumer survey	332	Income
Paneer	Meerut	1994	Consumer survey	150	Income, Education, Occupation
Paneer	Baroda	1994	Consumer	280	Expenditure survey

Source : IRMA MTS Report No. 761, 772, 777, 803, 812, 851, 980 (PRM series); No. 1, 75, 76, 80 (OYP series) in the order as presented in the Table

studies to other products and areas.

Pol (1991) while assessing and demographic contributions to marketing in 329 studies between 1980 and 1988 observed that "because few studies make concept / variable linkage clear, the value of adding a demographic dimension is lessened. In addition, most likely responsible for a wide variety of variable operationalization seen." The

Table 2. Demographic Variables - Influence on Market of Various Food Product Categories

Product category	Demographic variables associated with market potential
Essential and traditional food	Income, Linguistic group
Non-essential low priced products	Income
Non-essential high priced products	Income, Age

product category - demographic variable linkages as emerged from studies are shown in Table 2.

The above framework finds further support from a study carried by Mehta and Merchant (1992). Using Indian Market Research Bureau (IMRB) panel data large differences were observed in consumption volume across income groups in Bombay and Madras. The differences were less pronounced in 'essential' products like edible oil and tea and were higher in magnitude for 'non- essential' packaged food products like milk foods and chocolates.

In the same study, usages by volume declined for edible oil, tea, coffee, chocolates, sauces/ketchup over two time periods between 1989 and 1991 with exception of biscuits due to major price hikes. This indirectly supports our evidence that income is an important factor governing consumption volumes.

The generalisation of above framework is limited to populations as typical as India, where larger part of the income is spent on food. The latest National Sample Survey (NSS) 45th round (July, 89 - June, 90) based on 28744 households covering rural and urban areas has again confirmed such trends on food expenditure (Table 3)

Second important feature of Indian population is of wide food habits across linguistic groups, which cannot be ignored by marketers. Age becomes a important factor in life-style products, which were not consumed in a traditional household.

Operationalisation Problems

Two more research studies on market potential estimation of blended edible oil and white butter gave some insights into operational problems likely to be associated with the use of demographic variables in such exercises.

Table 3. Percentage Expenditure of Total Monthly Per capita Expenditure (MPCE) on Food in India in Rural and Urban Areas

MPCE Class (Rs/capita)	Urban	Rural
<110	73.67	74.70
110-215	68.60	69.45
215-385	61.48	62.54
>385	43.46	46.10
All Classes	**55.25**	**64.50**

Source : Report of NSS 45th Round (July, 89 - June, 90)

The study consisted of survey of 305 households, 60 retailers and 98 institutional buyers (hotels, restaurants and bakeries) in Gujarat in August 1992 to estimate market potential of white butter manufactured by ABAD dairy. The analysis relates to a sample of 145 households, 25 retailers and 45 institutional buyers. The research design included product briefing through 'story board' followed by personal interview on the basis of field tested structured questionnaire method led to identification of secondary data and methodology gaps. These include :

(i) Secondary data on a number of households were not available for the census 1991 (not yet published). So, it was a problem of delayed availability rather than non-availability. Sample estimates on household sizes were used to estimate number of households and population of Ahmedabad as in 1991 census.

(ii) The proportion of households falling within target market segment i.e., household income Rs. 3500 per month were not available in any of the secondary data sources. Assumption was made to work out a number of households in the target group.

(iii) Although buying intentions differed across income classes (Rs. 3500 per month) and linguistic groups, we could not find a way out to operationalise it across each income-linguistic segment.

(iv) Along with data on buying intentions, data on likely rate of substitution of the existing product (home made in this case) need to be collected to introduce further precision in existing estimates.

Discussion

The use demographic variables for the purpose of estimation of market potential poses its own problems. Pol (1991) in his extensive assessment of demographic conditions to marketing pointed out : "demographics play a specific role in marketing, clearer concept/measure relationships, better techniques, and more expanded applications can bring about an improvement in the quality of work seen". In this context, we are putting forward some arguments for using demographic variables inspite of criticism of such an approach elsewhere. The use of income as a variable has come under criticism primarily for two reasons : firstly, it is difficult to estimate and secondly, it is a measure devoid of behavioral dimensions.

The food product grouping is based on the fact that in certain food products, preferences seem to develop because of variables other than income.

Kaushal and Khanna (1992) observed "under reporting of incomes is one reason why research agencies like Research International use socio-economic classifications - occupations of chief wage earner, education and total numbers of wage earners in a house hold - instead of merely relying on income data". We also shared similar experiences, but it appeared that such a limitation could be overcome when income was measured in two components, i.e., monthly household expenditure and annual savings. However, we did not have substantial empirical evidences to support our observations. With regard to income being an inadequate criterion to establish clear linkages with consumption or purchase, our studies clearly indicate existence of such a relationship, at least for food products. The reason, as explained earlier,is high proportion of average expenditure (55-65 per cent) on food in a typical Indian household. This may go as high as 74 per cent in low income category households. In such a situation, behavioral dimensions are likely to play less important role as compared to income. We have every reason to believe that such a relationship also exists in other developing countries.

The food product grouping is based on the fact that in certain food products, preferences seem to develop because of variables other than income. Linguistic grouping is an important variable in the case of certain basic and traditional food products. Age along with income becomes relevant, when it comes to modern and highly priced food products.

Income seems to be the sole criterion in consumption of products like jams, ketchup, pickles etc. manufactured by traditional food industry. This product categorisation may be taken as tentative for the time being, pending systematic empirical evidences.

While operationalising the application of these demographic variables in estimation of market potential, we felt the need for segment-wise data generation on usage level in case of existing products or buying intentions and extent of purchase/substitution for new products. Such an approach would probably improve the precision of market potential estimate, when differences in usages or buying intentions are better explained by more than one variables. This will require

much more rigour in analysis of survey data rather than the survey technique itself.

Further, the operationalisation of this study faced more serious limitations in terms of non-availability of income categories through census data, or any other large data base like National Sample Survey (NSS). Although the Market Research Society of India has attempted to harmonise demographic data for use in various studies across the country, it has not been able to provide any alternative data base. This probably seems to be the most serious limitation in operationalising this methodology. As long as such a data base is not available, the estimates derived from sample itself would come handy, provided the sample is large enough and drawn randomly. In view of this limitation, explorations into other possible methods like market build-up method and weighted factor index method revealed that these methods would also require similar demographic data base as chain ratio method.

Conclusion

In a situation where food industry is growing at a rapid pace, the significance of market potential of various food products becomes important in determining the direction of growth and marketing success of the existing and new food products. Towards this end, the present study has indicated that the demographic variables such as income, linguistic grouping and age show close relationship with consumption pattern and, in turn, can be used in estimating marketing potential of food products. However, non-availability of population estimates for these variables limits its applicability over geographical areas and products.

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Tea : A Refreshing Beverage

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Introduction

Tea is the most popular and one of the oldest known beverages in the world. It is said to have originated from the Central Asian countries. Types of tea depend on the manufacturing process and degree of fermentation. The complex chemical composition of tea is responsible for its pharmacological and physiological properties. The industry provides jobs to millions of people. Technological advancement has led to the production of convenient product like instant tea and tea complete powder.

"Tea" refers to the plant *Camellia sinensis*, the dried, processed leaf manufactured from it, extracts derived from the leaf, and beverages prepared from the leaf or extract of this species. Apart from its extensive usage, it is of interest to the food technologist as well as to the biochemist and organic chemist, because of the dependence of the final product characteristics on the usual chemical composition of the starting material (Reed, 1983). The development of the most characteristic attributes of tea (i.e. the flavour and colour of the beverage) is dependent on the manipulation of tea leaves to induce certain endogenous biochemical changes (Scott, 1964). The earliest mention of the use of milk in tea appeared in a book of travel by the Dutch author, Jean Nieuhoff, who observed this practice in Canton, China in 1655 (Encyclopaedia Britannica, 1963).

Types of Tea

Many different types of tea are marketed in the world today. Fundamentally, they are derived from the same species of the plant, namely, *Camellia sinensis*. The differences between finished tea products are due to a) quantitative differences in composition and physical properties of the fresh green tea leaves which are determined by the genetics of the clones of tea used, the climate, the soil and the agricultural practices used, and b) the manufacturing process used and the degree of fermentation. The three types of tea are - i) Black tea which is fully fermented, ii) Green tea which does not require any fermentation and iii) Dolong and Pouchong or red tea which is partly fermented.

Almost all the characteristics of manufactured tea - its taste, colour and aroma - are associated with conversions of the tea leaf tannin.

Chemical Constituents of Tea Leaf and Manufactured Tea

The chemical composition of the tea leaf and manufactured tea is very complex. The following classes of compounds have been identified in the tea leaf : 1) Tanning substances, 2) Flavonols, 3) Alkaloids (caffeine, theobromine, theophylline), 4) Proteins and amino acids, 5) Enzymes, 6) Aroma forming substances, 7) Carbohydrates, 8) Pectic substances, 9) Chlorophyll, carotene, xanthophyll and other pigments, 10) Organic acids, 11) Vitamins and 12) Mineral substances.

Tanning Substances

The total content of tannin in young two or three leaf flushes averages 25 to 30 per cent. Tea tannin is a complex mixture of organic compounds known to be derivatives of polyhydroxyphenols (Roberts and Williams, 1958). Almost all the characteristics of manufactured tea - its taste, colour and aroma - are associated with conversions of the tea leaf tannin.

Bokuchava (1965) reported three constituents of tannin in the crystalline form namely, (-) epicatechin (0.14% of tea dry weight), (-) epigallocatechin (0.25%) and (-) epicatechin gallate (0.32%). Bradfield *et al.* (1965) and Bradfield and Penny

(1966) further isolated seven catechins from Ceylon green tea namely, (-) epicatechin, (+) catechin, (-) epigallocatechin, (+) epigallocatechin, (-) epicatechin gallate and (-) gallocatechin gallate.

It has been reported by Millin and Rustidge (1967) that the tea catechins or flavonols are water soluble, colourless substances with an astringent taste. They rapidly oxidise, especially in an alkaline environment. Bhatia and Ullah (1968) have shown a positive correlation between the tea beverage quality and fresh leaf flavonols which decrease, as the leaf ages. They also demonstrated that tea flavonols occur in the cytoplasmic vacuoles of leaf cells.

Flavonols

Flavonols of the tea plant represent a group of compounds which are very close to catechins in chemical composition, but differ in a higher level of the primary diphenylpropane nucleus. Flavonols include mono-, di- and triglycerides of kaempferol, quercetin and myricetin. As sugar components, they involve glucose, rhamnose, galactose, arabinose, retinose etc. Stagg *et al* (1977) reported that theogallin (3-galloylquinic acid) is unique to tea and occurs at relatively high concentration (1% of dry weight).

Alkaloids

The great popularity of tea as a beverage can be accounted for, mainly by the presence of alkaloids such as caffeine, theobromine and theophylline.

Caffeine or theine was discovered in tea by Oudrey. Caffeine content reaches 1 to 3% in coffee beans and 3 to 5% in tea leaves and manufactured tea. If calculated per cup of liquor, coffee and tea contain similar amounts of the alkaloid as reported by Sanderson (1970). Caffeine has diverse physiological effects on the human body. It influences the central nervous system and the cardiac, muscular and renal activities. It accelerates metabolism and oxygen

The great popularity of tea as a beverage can be accounted for, mainly by the presence of alkaloids such as caffeine, theobromine and theophylline.

intake by body tissues. Caffeine's effect on the body tissue implies a better blood supply to it, which, in turn, improves cardiac activity and increases the work capacity of skeletal muscles. Caffeine has an additional advantage that it is not accumulated in the body, thus ruling out the possibility of toxic effects from high tea consumption (Johnson, 1972). Kevanishvili (1948) established that during tea processing, caffeine reacts with tannin to form a compound termed caffeine tannate, which has a pleasant taste and aroma, although separately each has a bitter taste.

Roberts (1958) showed that during tea leaf processing, caffeine is associated with theaflavin to form a compound which imparts "briskness" to the tea infusion. It has also been reported that caffeine-tannin combination often yields the so-called tea crea which, when cooled, makes the tea infusion turbid. The tendency of caffeine to form complexes with polyphenolic material affects the behaviour of tea beverages as well as the technology of instant tea manufacture.

Caffeine has diverse physiological effects on the human body.

Proteins and Amino Acids

Proteins are important constituents of the tea plant. But a high protein content in the tea leaf at the expense of tannin can degrade the taste of manufactured tea, since the processing of black tea involves a protein-tannin reaction, producing insoluble compounds.

Krishnamurthy *et al.* (1952) detected the following amino acids in black tea : aspartic acid, leucine, glutamic acid, phenylalanine, valine, alanine, serine, asperagine, tyrosine, arginine, histidine, lysine and proline. Cartwright *et al.* (1954) reported that theanine (5-N-ethylglutamine) is an amino acid unique to tea, whereas other acids found in tea are common to most plants.

Bokuchava and Popov (1966) studied the impact of amino acids in the formation of tea aroma. They also claimed that catechin- amino acids reaction in the presence of O-diphenol oxidase, or at high temperatures, results in the formation of aldehydes, which are responsible for the tea aroma.

Enzymes

All basic informations of substances in living organisms occur with the aid of enzymes, which give them exceptional significance in the vital activity of plants and animals. The conversion of fresh tea leaves into manufactured tea of different types and grades is based on the effect of enzymes in the raw material.

Lamb *et al.* (1958) reported several enzymes in the tea plants namely, invertase, amylase, beta-glucosidase and pectinase. Sanderson and Roberts (1964), Sanderson and Graham (1973) and Sekiya *et al.* (1976) established that conversion of tea leaf into black tea is because of the primary oxidative enzymes of the tea leaves namely, O-diphenol oxidase and peroxidase.

Hatanka and Harada (1972) have subsequently isolated several enzymes in tea leaves such as pectin methyl esterase, alcohol, dehydrogenase, transaminase, peptidase, phenylalanine ammonia lyase, 5-dehydroshikimate reductase and tea metallo-proteins, the enzymes which oxidise unsaturated fatty acids.

Aroma Forming Substances

One of the most important characteristics of tea quality is aroma. It is generally recognised that the quality of different tea grades depends first on taste and aroma. The small leafy varieties growing in areas subject to cool periods are most likely to develop the best aroma.

Takeo (1975) stated that important changes in aroma occur during the first stage of tea manufacture. He further identified over 300 compounds of black tea aroma, but in aggregate they account for only 0.1% of dry weight. However, the most important aroma compounds include terpenes, terpene alcohols, lactones, ketones, esters and spiro compounds. Bajaj (1979) identified phenylacetaldehyde as a significant black tea aroma component, apart from ionones, terpene alcohols, terpene aldehydes and their oxidation products such as theaspirone and dihydroactinidiole.

Vitamins

The physiological significance of tea is enhanced because of the presence of vitamins P, C, B, pp etc. Saijyo and Kuwabara (1967) conducted several biochemical studies and showed that the favourable effect

The conversion of fresh tea leaves into manufactured tea of different types and grades is based on the effect of enzymes in the raw material.

of tea not only depends on caffeine content, but also on the catechin content. They were found to be responsible for the tea taste and vitamin P activity. It was further reported that it is due to catechins that the tea is a rich source of vitamin P.

This means that regular consumption of catechin-rich tea may meet human requirements of vitamin P. This is of particular importance because the content of vitamin P in other foods is very low. Since tea is consumed all over the world, the problem of adequate supply of

The wide consumption pattern of tea is attributed to the pleasant taste and aroma as well as to its healthful effects on the human body.

vitamin P can be best resolved through increase in tea manufacture and consumption.

Healthful Properties of Tea

The wide consumption pattern of tea is attributed to the pleasant taste and aroma as well as to its healthful effects on the human body. It has been demonstrated that peculiar features of the chemical composition of tea are responsible for its important pharmacological and physiological properties.

It has been claimed that the tea produced a healthful effect on the digestion, nervous system, blood vessels, facilitated the cardiovascular function, decreased blood pressure and increased the vital energy of man (Peligaut, 1946).

Vorouteov (1946) showed that tea is an excellent diaphoretic. It stimulates metabolic processes in the human body and plays a certain prophylactic role. Kursanov *et al.* (1950) have reported that tea alkaloids - caffeine, theobromine, theophylline - contribute to cerebral vasodilation and therefore, tea is one of the best drugs against mental fatigue. They also concluded that tea is beneficial against flu or cold induced fever.

Ulyanova (1966) observed that scurvy could not be cured completely with the aid of ascorbic acid alone, whereas it could be well cured with vitamin P, which also increased total resistance to infectious diseases. Sobolova *et al.* (1976) demonstrated that vitamin P fortified tea dyes of brown and yellow colours, due to their high content of catechins, act as effective stabilisers of milk fat and increases resistance of confectionery fat to oxidative rancidity. Among important biological properties of tea polyphenols, mention should be made of their antimicrobial action. Berdyeva (1977) has shown experimentally that tea polyphenols have a high bacteriocidal and bacteriostatic activity. This property is respon-

sible for the curative effect of green tea brew effectively used to treat dysentry patients. Obviously, a wide distribution of tea throughout the world, primarily catechin-rich green tea in hot climates, may be attributed to its antimicrobial effects.

Alpatov and Bear (1979) have demonstrated that tea extract has a strong protistocidal effect which means that it can be used against certain protozoan diseases of man and farm animals.

Technology of Tea Manufacture

Tea manufacturing includes different technological processes. Tea production technology is aimed at modifying the chemical composition of the raw material in order to produce new taste and aroma compounds, responsible for the taste, colour and aroma of the manufactured tea that are so highly valued by the consumer. Tea production technology is, essentially biochemical technology, since the transformation of the green tea leaf which has a bitter taste and grassy odour into an aromatic and tasty manufactured tea is based on biochemical processes.

The manufactured teas that come into the market can be divided into four groups with respect to the production technology used. This classification is, strictly speaking, based on the use of enzymes in the course of raw tea treatment.

An application of enzymes throughout the entire process, that includes withering and fermenting stages, yields the so-called fermented teas which include all brands and grades of black tea, including instant black tea. An arrest of enzyme activity at an early stage of tea processing, by steaming or roasting raw tea yields the so-called unfermented teas which include different brands and grades of green tea with a specific taste and aroma, including green brick and green instant teas. A partial - about 20 to 30 per cent - utilization of enzymes of tea flushes in tea production that combines enzymic processes with thermal treatment yielding the so-called red tea, or Oolong tea, with a rich and strong aroma, reddish infusion and pleasant taste.

Black Tea Manufacture

Black tea production technology is based on biochemical processes, among which the leading role is played by oxidative enzyme processes that determine the course of treatment and the quality of the finished products.

The most important stage in black tea manufacture is fermentation.

Harvesting of tea shoot tips : Keegal (1958) reported that the good quality black tea, tea bushes are regularly pruned to about one meter height to encourage a continuous supply of fresh shoot tips resulting from regrowth. Coggon *et al.* (1977) explained that for good tea quality, shoot tips at the proper stage of development (i.e. two leaves, a bud and the included stem) should be selected with minimal physical damage.

Withering

Withering is the first important step in black tea manufacture. The withering step is carried out to biochemically and physically prepare freshly plucked tea leaves. The physiological and biochemical processes that occur in the living tea leaf before plucking, continue afterwards, but become different. The purpose of the withering stage is to alter the pattern and rate of these processes, to change the chemical composition and physical properties of the leaf, in order to prepare it for further processing procedures - rolling and fermentation.

Keegal (1958) and Child (1960) have opined that withering involved the phenomenon of loss of moisture in tea leaves from about 78 per cent to about 68 to 55 per cent, carried out under conditions that prevent the temperature of the respiring tea leaf from rising about 24^0C. According to Sanderson (1964, 1968), the objective of withering was to destroy the semi-permeable properties of the cell membranes without causing breakdown of the tissues involved.

Tissue maceration of rolling : The second important step in tea manufacture is rolling of the tea leaf. Its main purpose is to complete the maceration of tea leaf tissues to induce fermentation. The rolling step proceeds slowly, thus providing a gradual excretion of tea leaf juice and its adsorption on the surface of the rolled leaf. This is very important to accelerate fermentation and oxidation, since the juice contains the very substrates - tannin and catechins - which undergo the action of tea leaf oxidative enzymes, primarily O-diphenol oxidase.

Harler (1963) showed that Indian and Sri Lankan tea factories use both rollers and machines of continuous operation - the Rotorvane and CTC (crushing, tearing and curling) - which provide simultaneous crushing, grinding and rolling of tea leaves, thus reducing the rolling and fermentation time to one to two hours.

Fermentation : The most important stage in black tea manufacture is fermentation. The biochemical change

developed during the withering stage proceed at the most rapid rate during fermentation. These changes result in profound qualitative and quantitative changes in tea leaf constituents, contributing to the formation of new taste and aroma products responsible for the character of manufactured black tea. The fermentation process starts with rolling, but does not end there.

Roberts (1962) and Sanderson (1972) stated that the central reaction in the fermentation is the oxidation of catechins to O-quinones which, in turn, combine with one another to form theaflavins having bright red colour and a fair solubility. When theaflavins or epitheaflavic acid condense with oxidised catechins, polymeric thearubigins are formed, having dark brown colour and fair to poor solubility (Cattell and Nursten, 1976). Sanderson *et al.* (1976) showed that these oxidation reactions of catechins determine the colour and taste of the finished black tea product.

Sanderson and Graham (1973) explained that aroma of black tea is formed during the tea fermentation. Besides the critical role of catechin oxidation in the formation of black tea aroma, there is evidence that biosynthetic reactions are important in forming terpenoid compounds (Wickremasinghe, 1978). Coggen *et al.* (1977) explained that a metallo-protein caused the formation of some black tea aroma constituents by direct catalysis of precursor transformation to volatile aroma constituents.

Firing: The fermented tea leaf enters the firing room, where it immediately undergoes firing at a high temperature of 90 to 95^{0}C. The firing process is performed in special dryers. The hot air from the heater reduces tea moisture content to 3 - 4 per cent. The firing stage is followed by a sorting process to make the half- finished product marketable.

Sanderson *et al.* (1971) have reported that drying with an air inlet temperature of 90^{0}C and exhaust temperature of 52^{0}C for about 20 minutes reduces the moisture content of tea to about 2-4 per cent. The chemical changes that take place during firing are not well understood, but are most important to the development of the finished black tea. Sanderson (1972a) has stated that when the coppery coloured tea plant material comes out of the dryer, it has a pleasant tea taste. It has been further explained that the heat and the drying action drives off some of the volatile compounds with the result that a new balance is achieved between the black tea constituents that are more than three hundred in number.

Green tea exerts a stronger effect on the human body than black tea as it contains larger amounts of important substances as catechins, vitamins and other compounds.

Grading and Storage: Subtle chemical changes take place during the storage of finished tea products that lead to a loss of all residual greeness and harshness within a few weeks time.

Tea remained sound and full of flavour for more than a year when kept in a cool place and protected from moisture and oxygen. Stagg (1974) demonstrated that storage under adverse conditions led to the development of undesirable flavours with consequent loss of value. Takeo (1975) graded the fired tea according to descending particle size as orange pekoe, pekoe, broken orange pekoe (BOP), broken orange pekoe fannings (BOPF), fannings and dust.

Green Tea Manufacture

Green tea is a valuable food product which is widely consumed in many countries of the world. With respect to the demand in the world market, green tea is inferior only to black tea. Green tea exerts a stronger effect on the human body than black tea as it contains larger amounts of important substances as catechins, vitamins and other compounds. It contains two times the vitamin C content of black tea.

Yamanishi (1975) reported a high proportion of catechins and amino acids compared to black tea. Yamanishi (1981) experimented with different aspects of green tea and observed that green tea beverage is pale yellow green, slightly more astringent than black tea and has a brothy characteristic imparted by theanine and other amino acids.

Oolong and Pouchong Tea Manufacture

It occupies an intermediate position between the black and green teas and is characterized by being partially fermented. Oolong tea is about 50 per cent fermented, whereas pouchong tea is only about 30 per cent fermented. Literature shows that these types of teas are made in China (especially Taiwan) and their special flowery flavour appears to depend on local varieties of tea plants and the effect of local climate.

Flavoured Teas

Some of the world's best known teas are made by adding flavouring materials to more basic teas. Jasmine tea is usually made by adding jasmine flowers to pouching tea to enhance its flowery flavour. Early Grey tea is made by adding bergamot oil to black tea (Read, 1983).

Instant Tea

Instant tea is a dry extract of natural tea. As regards its chemical composition and physiological effect, instant tea is a valuable product and, therefore is very popular in many countries. Instant tea is potable, completely soluble in hot water, and need not be pre-brewed.

Commercial instant tea is made by extracting finished tea products and converting these extracts into soluble tea powders by spray drying the extracts (Sanderson, 1972b ; Pintauro, 1977). Cold water soluble instant tea products have been reported and were manufactured by chilling the tea extract, separating the insoluble caffeine-tea polyphenol complex that formed and treating this precipitate in such a way so as to render it soluble (Takino, 1976).

Tessmar (1972) suggested preparation of instant coffee or tea in which the coffee or tea powder in each case was blended with solid or semi-solid fat. This could be packed in tubes if having semi-solid consistency or made into cubes if solid. Hoogstad (1988) prepared a tea extract in liquid form by freezing it in a thin layer of 0.2 to 5.0 mm, on a rotating drum so that freezing could be achieved in 3-10 seconds. The frozen layer was disrupted into flakes of thickness of 0.15 to 1.5 mm and then freeze- dried.

Masters (1972) suggested a technique for the manufacture of instant tea and similar products for the extraction of tea leaves in counter-current extractors either in continuous or semi- continuous manner to get a yield of 15.20 per cent followed by the concentration of extract under vacuum with the provision of condensation for vapours containing aroma constituents to be recovered. The recovered liquid becomes an aroma extract to be blended into the extract concentrate prior to spray drying.

Bein (1973) prepared a cold beverage of coffee and tea by introducing measured quantities of cold water into an air-tight can or bottle which contains freshly ground or instant coffee and any form of tea followed by addition of milk cream and sugar and sterilizing the mixture at 80^0C for ten minutes. The resulting beverage had a pleasant taste and aroma when cold and even when reheated.

Commercial instant tea is made by extracting finished tea products and converting these extracts into soluble tea powders by spray drying the extracts.

Gulua *et al.* (1984) were granted a patent for manufacturing a tea concentrate by extracting tea leaves with water, filtering the extract and then concentrating it followed by secondary extraction. It was suggested that the primary extraction be done at 80-90^0C and secondary extraction at 95-100^0C with 0.01-1.0 per cent solution of citric acid and 0.1-1.10 per cent sodium metabisulphate (by weight of extract). Schott (1988) prepared instant teas, fruit teas and tea-like beverages in paste, powder or granular form which consisted of tea leaves, cocoa powder, edible acids, vitamins and flavouring.

Syfert *et al.* (1988) developed a tea concentrate containing tea solids (0.4-8.0% by weight), edible gums (e.g. xanthum, cellulose, locust bean, guar) and sugar. It had a pH of 4.6 at 20^0C and was stablised against the growth of most pathogenic organism without the use of preservatives. Tea beverages prepared from the concentrate had low astringency, fresh brewed flavour, enhanced mouthfeel, freeze-thaw stability and enhanced cold water solubility.

Hoogstad *et al.* (1989) developed a particulate instant tea product, comprising 2-25 per cent fat, 5.25 per cent emulsifying protein, 10-40 per cent hydrolyzed starch, 10-40 per cent tea solids, 5-10 per cent water and 5-30 per cent lactose, which when reconstituted with water, gave a beverage similar to tea in taste and appearance.

An instant tea bag has been developed with telescopic drinking straw to enable the user to push the bag into the cup to ensure that its contents are completely dissolved. To preserve the flavour, the bags with attached telescopic straws were sealed into aluminium metallised film sachets (Anon 1980).

Tea Complete Powder

There is practically no literature available on the technology and physico-chemical properties of tea complete powder. During the course of investigation on convenience foods, Bhanumurthi *et al.* (1972) developed a product, having a composition as mentioned in Table 1.

Increasing trend towards tea consumption has led to the

Table 1. Average composition of Tea Complete Powder

Ingredients	Amount (per 100g)
Milk fat	13.0
Milk SNF	31.5
Sugar	39.5
Tea solids	14.0
Moisture	2.0

Source : Bhanumurthi *et al.* (1972), Research Activities : National Diary Research Institute, Karnal.

introduction of a large number of tea brands at competitive rates in the consumer market, all of which employ the same technique for preparing the tea beverage. The technique adopted to make the tea beverage involves the addition of water, milk, tea leaves and sugar, boiling for a certain duration and then filtration. Since in our country preparing tea is the most common practice - almost in every household, institutions, commercial and catering establishments and places of common utility - the above mentioned method is a long and cumbersome process and involves a lot of time. In addition, the problem is confounded by the fact that there is no standardized product available in the market conforming to certain standards, which may even partially meet the large variation in tastes and preferences of the populace across the length and breadth of the country.

Increasing trend towards tea consumption has led to the introduction of a large number of tea brands at competitive rates in the consumer market.

Looking to these facts, the importance of a product like tea complete powder can be well understood. Some trials were conducted to overcome the above mentioned difficulties. The objectives were to standardize the method for the manufacture of tea complete powder, study its physico-chemical characteristics and to evaluate the sensory attributes of the reconstituted product. The product was found to be acceptable with a little loss of fresh tea aroma (Jha, 1991). It is a product which is ready for reconstitution into tea without the burden of assembling all the ingredients for brewing tea, as it already contains all these basic ingredients namely milk, tea solids and sugar. This can be very easily reconstituted into tea beverage by the mere addition of hot water and gentle stirring.

Such a product will be highly suitable for use in large scale catering establishments and for meeting the demands of the travelling public. Increasing thrust towards urbanization of the society has resulted in the introduction of vast number of packaged foods and ready-to-eat convenience products in flexible packages at competitive rates. Therefore, it will be a highly appropriate technology for large scale manufacture of such products standardized.

Overview

Though India remains the largest producer of tea in the world, its share in the world market has significantly declined form 32 per cent in 1975 to only 20 per cent in the year 1990-91, thereby reducing the foreign exchange earnings of the country on this account. This declining trend of Indian tea in the international market is attributed to increased domestic consumption as well as the lack of value-added products.

An appropriate low-cost technology could be developed so that a standard product is made available for western markets where convenience foods are in great demand.

An appropriate low-cost technology could be developed so that a standard product is made available for western markets where convenience foods are in great demand.

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Recent Developments in Further Processed Poultry Meat Products

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Introduction

In India, poultry population has increased by almost hundred per cent from 160 to 310 million heads and poultry meat production by two hundred per cent from 111 to 319 thousand metric tonnes during the last decade (FAO, 1990), showing the fastest growing area in the animal husbandry sector. There are five modern integrated poultry processing plants in the country. With the increase in urbanisation, education, per capita income and industrialisation, people are becoming more quality conscious, therefore, preferring broilers to spent layers and parent stocks, which are comparatively tougher, less juicier and more chewy thereby fetching lower price. These lower valued poultry meat has a great potential for use in further processed poultry meat products (Samoon and Sahoo, 1993) to obtain maximum profit. Thus, the area of further processing of poultry is highly relevant and would provide very useful information for the progress of future poultry industry in India.

Further processing of poultry involves conversion of raw poultry carcasses into value-added and convenient-to-use products, such as pre-cooked, enrobed and / or breaded and restructured products, cold cuts like bologna, burger patties and newer variety products like chicken nuggets etc. (Baker and Bruce, 1989). Further processing encompasses such processes as portioning, deboning, size reduction, massaging, tumbling, reforming, flaking, emulsifying, breading, battering, smoking, curing and cooking (Richardson, 1989). The whole dressed poultry carcasses, which undergo any of these processes may also be referred to as further processed products.

Further processing encompasses such processes as portioning, deboning, size reduction, massaging, tumbling, reforming, flaking, emulsifying, breading, battering, smoking, curing and cooking.

Evolution of Further Processed Poultry Meat Products

The concept of further processing of poultry was evolved during the last few decades and major strides have been made in this direction in USA, UK and other parts of the world in recent years. This has resulted due to a great potential for utilisation of surplus poultry meat for conversion into ready-to- eat and convenient products to meet the consumer demand, in view of changing life

styles for such products to save considerable time and labour. Further processing has also facilitated greater utilisation of dark poultry meat cuts, which have lower consumer preference in these countries. The overall poultry meat consumption has also increased partially due to growth of further processed products (Anon. 1986). The market for luncheon meats is also growing in these countries, as the consumers look for the products with less fat and fewer calories.

In India, with rapid strides being made in industrialisation and urbanisation, food habits and consumer preferences are changing with more women taking outdoor jobs, thereby creating the necessity of providing further processed, packaged and ready-to-eat and serve convenient foods including meat products. Now-a-days, development of modern refrigeration facilities, improved products processing technologies, availability of versatile packaging materials like laminates and retort pouches, vacuum packaging and modified atmosphere packaging methods have greatly facilitated popularisation and growth of further processed poultry products. There is also a very good scope for development and marketing of these products in future.

Available Products

The eviscerated ready-to-cook carcasses of chicken, turkey and other classes of domestic poultry are converted directly into value-added products such as tandoori, barbeque, canned, battered, breaded, enrobed and frozen variety products. Alternatively, these are deboned manually to use in the formulation of outlet, fillets and marinated products, or mechanically to utilise lower valued tougher cuts in the manufacture of ground and emulsion type products like patties, burgers, frankfurters, bologna, hot dog etc.

Mountney (1976) has described the product formulation and processing aspects of several further processed poultry products like cured, smoked and barbecued chicken etc. Richardson (1989) has listed the generalised recipes and processing schedules for various further processed poultry products like reformed turkey roasts, pre-cooked turkey rolls, grill steaks, hams,burgers etc. Stadelman *et al.*, (1988) have compiled the nutritional data on some further processed chicken meat items such as nuggets, fillets, planks and spicy nuggets etc., sold by fast food restaurants in USA. Increasing quantities of poultry meat are being diverted now-a-days in several parts of the world towards making traditional products made previously from red meats, as well as a variety of novelty products that have no counterpart in red meat products. These include cut-portions, reformed roasts, rolls, sausages, grill steaks, burger, turkey hams, nuggets, sausages, frankfurters, salamis, bolognas etc., (Baker and Bruce, 1989) and value-added turkey sausages incorporating turkey skin and fat (Sahoo and Berwal, 1993). In India, now-a-days, meat- based fast foods such as tandoori chicken, kababs, tikkas, koftas, burgers, nuggets, rolls, balls, cutlets, hot dogs and patties are becoming popular as further processed fast foods. (Sahu and Mahapatra, 1992).

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Advantages of Further Processing of Poultry Meats

The financial implications and other advantages of further processing of poultry have been cited extensively in the literature by various workers in recent years. The rationale for further processing of poultry is based on some major considerations that include the following :

i) Better utilisation of surplus poultry meats available in periods of peak production that are converted into products that are more stable during the storage and handling involved in the product channels, with a wider acceptability in the consumer market.

ii) More profitable utilisation of lower valued and bony cuts by better retrieval of meat components by mechanical deboning methods and their formulation into further processed comminuted meat products like frankfurters, loaves etc., thereby also lowering the cost of production.

iii) Adequate portion control, convenience to consumers and relatively convenient products quality.

iv) Providing newer and variety products like nuggets, grill steaks etc.

v) Opportunity to formulate low calorie and low fat poultry meat products for calorie conscious consumers.

vi) Conversion of raw poultry into value-added

products, thereby ensuring higher returns to the producers and better consumer satisfaction.

Technologies Available for Further Processing of Poultry

Most techniques for further processing of poultry have been adopted from red meat industry (Richardson, 1989). These include soaking as in case of marinades, to improve flavour or immersion in phosphate solutions to improve the water holding capacity, massaging and tumbling to improve product quality as well as recent concepts like hot boning and electrical stimulation of carcasses. Cuthbertson (1980) has reviewed the rationale and economic implications of hot boning of carcasses. The effect of electrical stimulation and its commercial implications in meat carcasses has been discussed by Bendall (1985) who indicated that tenderisation of the meat can be achieved in very short periods by electrical stimulation as compared to conventional ageing methods.

Several technologies that are available till date, include particle size reduction techniques such as mincing, chopping and grinding in case of ground meats and emulsification procedures for products like frankfurters, burgers, nuggets etc. Flaking and forming techniques are available for grill steaks, rolls and other products.

In formulation of restructured products like grill steaks that simulate intact cuts, steaks or chops in texture, addition of salt and phosphates has been recommended, coupled with various tumbling and massaging techniques to develop desirable product binding and texture in these products by several workers like Schnell *et al*., (1987), Acton (1972), Theno *et al*., (1976), Siegel *et al*., (1978) and several other workers. Samoon and Sharma (1991) have also reported the synergistic effect of salt and sodium tripolyphosphate in improving the functionality, product binding and texture in case of an emulsion type Kashmiri meat product - "Goshtaba". They also reported that hot processing and traditional pounding of meat caused better myofibrillar proteins extraction and product binding.

Blade tenderisation of tougher cuts obtained from spent fowl carcasses can be used to tenderise the excessive connective tissue as in case of red meats (Pearson and Tauber, 1984), in order to improve product binding upon heating. In recent years, techniques like flaking, using a combination of control flaking heads have been employed to achieve particle size reduction, and binding without adversely affecting texture and to tenderise tougher cuts of poultry. Pearson and Tauber (1984) have discussed in detail the available technologies for manufacture of sectioned, formed and restructured red meats. However, these technologies are being suitably modified and applied to poultry meat in recent years.

Flaking has been used to produce further processed poultry meat products like grill steaks that have been increasingly accepted and relished by the consumers.

Flaking has been used to produce further processed poultry meat products like grill steaks that have been increasingly accepted and relished by the consumers. The technique has also been used to improve the eating quality of poultry dark meats such as that obtained from leg and thigh cuts of poultry carcasses (Graham and Marriott, 1986).

Additives like egg white have also been used to improve the quality of dark meat from poultry species (King *et al*., 1986).

Product Binding and Texture

The product binding is largely dependent on the extractability of muscle protein into the interface of meat particles or chunks, especially in case of restructured meats. Protein extractability is more efficiently achieved by using various particle size reduction methods like grinding, chopping etc., in comminuted meats, which are invariably accompanied by a desired product binding and texture in these products. Most of the studies related to proteins extractability have been conducted mainly with emulsion type or comminuted meat systems and the findings have been applied to other products.

In highly comminuted meats, the protein extractability is largely dependent on pH and salt concentration (Richardson and Jones, 1987). Maximum protein extraction has been reported in the pH range of 5.0 - 5.7 and salt concentrations of 0.15 - 1.20 M. Facgeding (1987) reported that chicken meat proteins possessed similar solubility properties in the pH range of 5.0 - 7.0 and salt concentrations of 0.25 - 0.50 M. The importance of salt in extraction of myofibrillar proteins that play a major role in product binding was demonstrated by Acton and McCaskill (1972).

Salt concentrations used in product manufacture are lower than those which give optimum protein extraction (Richardson, 1989). However, in the initial stages of product binding, the concentration of salt at the meat particle interface is higher than at equilibrium in the final product. Hamm (1981) has discussed in detail the post-mortem changes affecting the quality of comminuted meat products. Polyphosphates enhance the effect of salt on protein extraction by enhancing pH and ionic strength (Traut and Schmidt, 1986). Meat proteins produce a better bind than other non-meat additives (Siegel *et al.*,1979). Maruyama (1986) has extensively reviewed the existing literatures available on myofibrillar cytoskeletal proteins of meat.

Binding of meat pieces obtained from turkey breast muscle was improved by tumbling, in presence of salt, sodium tripolyphosphate and sodium hexametaphosphate as compared to other phosphates (Froning and Sackett, 1985). However, leg meat was associated with lower protein extractability values. In general, poultry leg meat is considered to have a higher emulsifying capacity as compared to breast meat (Richardson, 1989). In case of emulsion type, further processed poultry products like frankfurters, the relative advantages of pre-rigor poultry muscle having a higher emulsifying capacity (Froning and Neelakantan, 1971) can be taken advantage of to formulate products with better binding and texture.

Recently, the enzyme "Transglutaminase" has been used to form cross-links between myosin molecules and between myosin and soya proteins, casein or glutens at temperatures and pH values found in meat systems (Kurth, 1983; Kurth and Rogers, 1984). Another process has been developed with sodium alginate as binder along with glucose - δ - lactone and calcium carbonate. These developments have facilitated chemically induced gellation and product binding without heating and use of salt and polyphosphates in further processed meat products (Richardson, 1989).

Application of heat during cooking of further processed meat products causes a certain degree of unfolding of proteins extracted at the interface of meat particles or chunks followed by coagulation and formation of a stable matrix that imparts cohesiveness, rigidity, texture and binding to the cooked product. These heat induced protein-protein interactions start at 30-31^{0}C in case of breast actomyosin and at 42-44^{0}C in case of thigh actomyosin (Acton and Dick, 1986). Xiong *et al.*, (1986) have reported similar findings. Facgeding (1987) reported greatest gel strength and stability of salt soluble proteins of turkey meat (breast and thigh) at pH 6.0 and a salt concentration of 0.5M and a more stable gel formations at pH 7.0. However, Asghar *et al.*, (1984) have found that gel strength of chicken muscle myosin was greater than that of red muscle at pH 6.0, under identical protein concentrations, ionic strength and temperatures.

The type of deboning machines used also influence the effectiveness of salt in reducing cooking losses of further processed products (Mast *et al.*, 1982). It may be due to rise of temperature during some deboning procedures.

The problem of poor binding and texture in further processed poultry meat products can be largely overcome by using 1 - 1.5% salt and 0.5% sodium tripolyphosphate in the product formulations and use of massaging and tumbling techniques.

Water Holding Capacity, Juiciness and Flavour

Salt and polyphosphates improve the moisture retention in poultry meat subjected to tumbling procedures (Froning and Sackett, 1985) by reducing cooking loss and increasing water holding capacity of chicken meat is influenced by salt, pH, type of meat and type of cooking etc., (Richardson and Jone, 1987) and it increases progressively in the pH range of 5.0 - 7.0 and salt concentration upto 1.3M at pH 6.0. Prusa and Bowers (1984) have also reported similar findings for frozen and thawed turkey muscle. McMohan and Dawson (1976) have reported a syngergistic effect of salt and polyphosphates in improving the water holding capacity of hand boned poultry, but polyphosphate was more effective in mechanically deboned meat. Offer and Knight (1988) have made a comprehensive review of literature related to structural basis of water holding capacity of meat.

Development of further processed poultry products invariably involves some double cooking procedures, once at factory level and then at consumer level that has been found to be associated with development of warmed over flavour similar to that of autooxidation of fats. It occurs due to excessive moisture loss with a resultant altered mouth feel by the consumers (Baker and Bruce, 1989). It can be overcome by incorporating 0.5% sodium tripolyphosphate in the product.

Product Discolouration Problems

Pinkish discolourations have been found in further

processed turkey meats, which may be due to contamination with nitrite (Richardson, 1989), refrigerated gases (Everson, 1984), pre-slaughter stress (Babji *et al.*, 1982) or variations in muscle myoglobin levels or denatured haemochromes (Conforth *et al.*, 1986). Such discolouration simulates portions of undercooked or raw meat and is unappealing to the consumer. Vacuum packaging has also been associated with dark colour of fresh and cured products. Such types of oxidative discolourations can be controlled by using 200 ppm sodium ascorbate. However, its use has been associated with a "greening effect" on poultry carcasses.

In young broiler carcasses, the haeme pigments may escape through the relatively less ossified ephiphysis of long bones into surrounding tissue causing "bone darkening" which is undesirable and can be controlled by rapid freezing and shorter ageing periods after slaughter.

Shelf Life and Rancidity Aspects

Higher incidence of oxidative rancidity in poultry meats due to presence of higher levels of unsaturated fats as compared to red meats, is yet another constraint associated with development of further processed poultry meat products. Turkey meat is more prone to oxidative rancidity than broiler meat due to its higher phospholipid content and lower levels of natural tocopherols (Maerek and Ball, 1974). Poultry thigh meat is considered to be more susceptible to oxidative rancidity than breast meat (Richardson, 1989), due to its higher myoglobin and iron contents.

Oxidative rancidity and warmed over flavour of further processed poultry products can be controlled by using vacuum packaging and modified atmosphere packaging techniques using oxygen impermeable packaging materials. More recently, modified atmosphere packaging for further processed poultry with 80% CO_2 and 20% air has been employed in special types of packages called "master packs" consisting of a double packaging that provides for escape of gases like H_2S from the meat and maintains desirable meat colour, besides preventing the ballooning effect of the gases in the package, at wholesale and retail stores in USA.

More recently, modified atmosphere packaging for further processed poultry with 80% CO_2 and 20% air has been employed in special types of packages called "master packs" consisting of a double packaging.

Barbut *et al.*, (1985) have successfully used a rosemary oleoresin extract to control auto-oxidation of turkey sausages by incorporating it in product formulations. Froning *et al.*, (1986) used "Conalbumin" obtained from egg white, to control oxidative rancidity in minced poultry, by chelating metal ions during storage. Donovan *et al.*, (1976) have reported that ovotransferin or conalbumin deprives the microorganisms of Fe^{3+}, thereby preventing their multiplication. The same mechanism could have operated in preventing auto-oxidation of fats.

Prospects for Development of Further Processed Poultry Meat Product in India

The decade of eighties had seen the poultry emerging as the fastest growing segment of agriculture in India. Within the poultry sector, broilers have grown in importance, having multiplied six fold with an annual production of about 168 millions at present and is expected to reach 450 millions within next five years (Chatterjee and Acharya, 1990). The per capita consumption of poultry meat has increased from 155 gms in 1976 to 405 gms in 1989. A large number of integrated broiler projects have also been set up in different parts of the country. The chicken is gaining importance as a source of affordable and widely acceptable meat. The consumption of all meats especially poultry is on the rise with increase in purchasing power of consumers, awareness about the quality and nutritive value of meat products and rapidly changing living standards of people.

The advent of modern processing in poultry has been associated with production of further processed broiler delicacies, to meet the demands of new generation for quality and hygiene and to suit the emerging fast food chains throughout the country. The setting up of processed and further processed poultry units has also opened newer avenues for export of poultry products. The present decade of nineties is expected to see the emergence of modern poultry processing as an ancilliary industry with growth in production of further processed poultry products.

In such a situation, the marketing of live or raw

ready-to-cook poultry provides for comparatively lower profit margins to the poultry producers. Thus, further processing is highly recommended to formulate value-added convenient products for a wider section of consumers, with an improved shelf-life and quality in marketing channels. It will fetch better returns to the producers, create greater employment opportunities and also lower the cost of production of poultry products in view of growing prices of poultry feeds in recent years.

Indian poultry industry can also use lower valued bony cuts of poultry carcasses, like wings, backs and necks etc., as well as spent fowl frames for mechanical deboning and conversion into a range of further processed products like nuggets, patties, sausages etc. Young and tender broiler carcasses can be converted into tandoori, barbecued, smoked and other chicken delicacies or enrobed and / or breaded products, battered products etc. Such products have a great consumer potential in various parts of the country, especially in major metropolitan cities, where demand for various ready-to-eat convenient foods is on the rise.

The potential poultry processors can utilise the inherent characteristics of poultry like low calorie, low fat and cholesterol values and high protein quality and its ease of adaptability to various cooking procedures, lack of religious restrictions etc. to their advantage in popularisation of such products. Advantage must also be taken of various concepts like hot boning or pre-rigor processing, mechanical deboning procedures and electrical stimulation to improve the product tenderness, texture, binding, save energy, improve recovery of proteins and facilitate better retrieval of meat from low valued and tougher cuts. Further processed poultry meat products can be introduced in hotels, restaurants, institutions, air lines, fast food chains and retail outlets like departmental stores etc., throughout the country.

Conclusion

The entire programme of further processing envisaged above is not without several constraints. These include inadequate marketing research to identify potential demand areas, development of effective marketing strategies and appropriate cost-effective packaging materials and systems to suit our tropical conditions to promote product stability and safety for longer periods in commercial marketing channels etc. The interests of various ethnic and religious groups must also be taken into consideration such as making provisions for *Halal* slaughter of birds at the processing plants, to increase the acceptability of such products to a wider section of consumers.

The advent of modern processing in poultry has been associated with production of further processed broiler delicacies, to meet the demands of new generation for quality and hygiene and to suit the emerging fast food chains throughout the country.

Other priority areas for further research include investigations related to various attributes of poultry meat, such as product functionality aspects, binding and gelation, texturisation, restructuring, massaging and tumbling techniques etc., to develop further processed poultry products, simulating intact cuts or carcass portions in tenderness, texture etc. Studies are also required to assess the feasibility of incorporating various extenders, fillers and binders such as maida flour, texturised soy proteins etc., and permitted chemicals like polyphosphates, nitrate/nitrite, sodium ascorbate etc., to improve the product quality and to bring these products within the purchasing power of common consumers in future.

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Efficacy of a Modified Buchner Funnel in the Decontamination of Aflatoxin B_1

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Abstract

A modified buchner funnel was fabricated and evaluated for its efficacy in increasing the filtration rate in the process of decontamination of aflatoxin B_1 from unrefined groundnut oil. The filtration rate varied from 4 ml/sec to 0.2 ml/sec depending on the quantity of aluminium silicate clays used for decontamination.

Introduction

Aflatoxins are secondary metabolites formed during the growth of *Aspergillus flavus* and *Aspergillus parasiticus*, when these fungi find a suitable substrate. Among the suitable substrates, groundnuts and maize are the high risk commodities. About 10-15% of the toxin remains in the oil, when infected kernels are expressed (Basappa and Murthy, 1974).

Many methods have been developed to decontaminate unrefined groundnut oil which are mainly based on the use of buchner funnel, membrane filtration (Basappa and Murthy,1977, 1979) and *seitz* filter paper (1/400) (Miller *et. al.*, 1985). However, with these conventional methods, there are problems of slow filtration, at higher pressures along with the oil, filter-aid/adsorbent/clay also gets filtered and the filtered oil contains the residues of the clay/filtered adsorbent.

The objective of the present study was to evaluate a modified buchner funnel for its efficacy in increasing the filtration rate in the process of decontamination of aflatoxin B_1.

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Materials and Methods

Fabrication of apparatus :
The modified buchner funnel (laboratory apparatus) similar to the one developed by Aneesuddin and Saxena (1971) was fabricated.

The apparatus (Fig. 1) was made in a workshop by turning on a lathe machine a 18 cm long, 12 cm diameter cylindrical aluminium rod cut into a shape of buchner funnel, consisting of two conical halves bifurcated in the process. The upper dome shaped half is provided with a nozzle having threaded a chromium plated bronze stop cock (readily available in market) screwed on to the threaded nozzle. Stop cock is used for opening and closing of the nozzle as required. To the upper end of the stop cock a plastic/metal funnel was attached for pouring the

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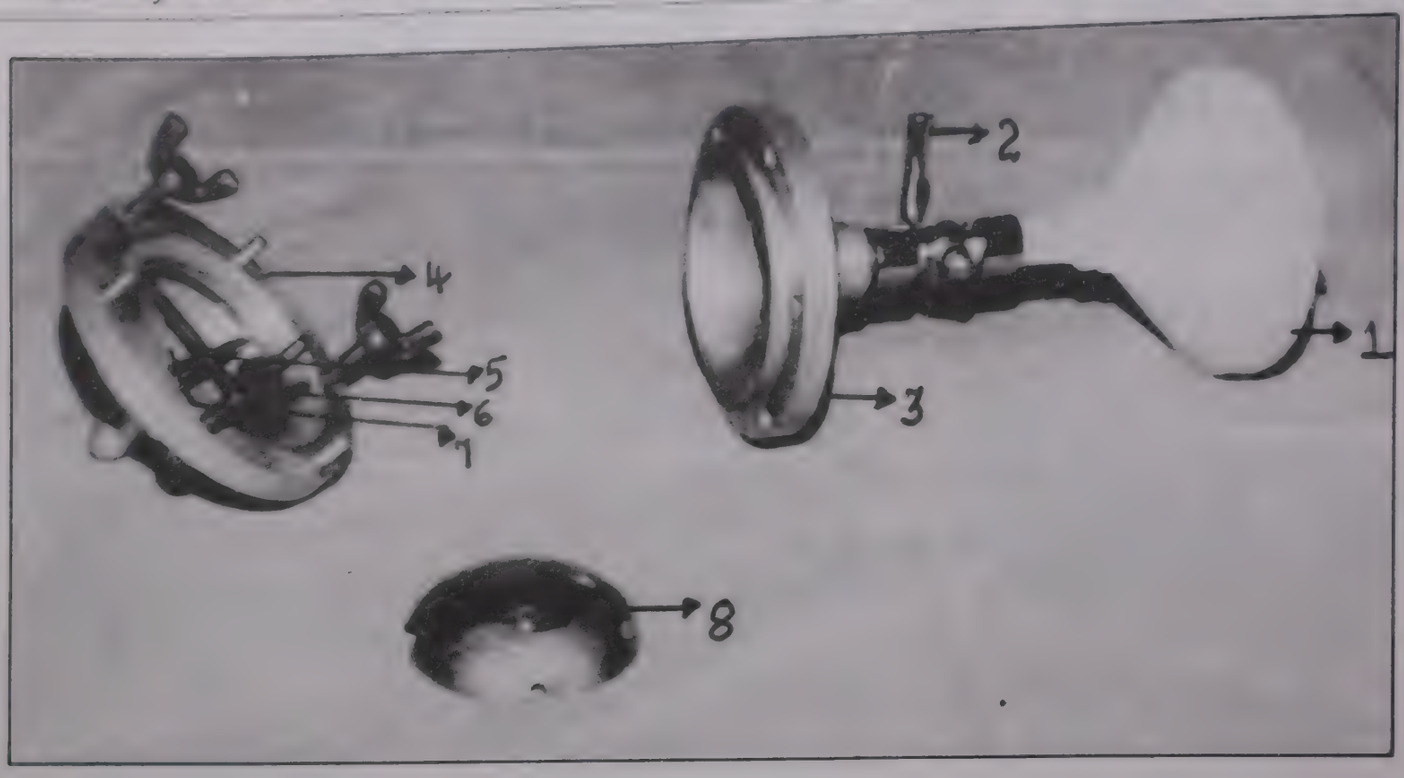

Fig. 1 Filtering Apparatus

1. Funnel 2. Stopper 3. Upper circular filter plate 4. Lower circular filter plate 5. Frame which holds the filter cloth 6. Wing nuts 7. Filtration area 8. Dome to cover frame which holds the filter cloth

oil or any viscous liquid.

The lower half consists of the circular dome - shaped filter plate, the inner side of which has a conical shape with an outlet nozzle to which the rubber stopper can be fixed. The rubber stopper will act as a cap to the filtering flask. A small circular metal plate with openings along the edges is fixed below the inlet tube on the innerside of the plate which is dome - shaped inside. This arrangement is to minimise the force of the liquid.

A filter cloth (Simplex mill's drill cloth which is used in filtration of oil in expeller oil mills) in the form of a circular piece of 8 cm diameter is placed between the filter plate. Fresh cloth should be used for each run. When the two halves are placed in position, the three cylindrical rods of 2.5 mm diameter projecting upwards from the lower plate house in the holes get drilled in the top dome - shaped plate and act as a guide to the top half to sit in proper position. The two halves are fitted together by means of bolts and wing nuts fitted in the holes provided for the purpose.

In view of the advantages cited in this paper the modified buchner funnel may be useful in increasing the filtration rate of oil.

The filtration area is a circle of 6.5 cm diameter. A rubber tube is connected to the filtering flask on one side and connected to conical flask on the other side. The outlet of the conical flask is connected by a rubber tube to a four way metallic junction. The other side is connected by a rubber tube to a stop cock for controlling the air to maintain vacuum and the top is connected through a rubber tube to a pressure guage and the fourth side is the bottom of the guage connected to the suction pump (high vacuum pump) adjusted to 400 mm vacuum. Suction pump provides the driving force required for the filtration. Three metallic stands are used to support the filtering apparatus, conical flask and pressure guage.

The unrefined groundnut oil was obtained from Jai Bharat Industries and aluminium silicate clays were obtained from Mines and Geology Dept. Andhra Pradesh and local market. The aflatoxin B_1 standard was obtained from Sigma chemicals.

The unrefined groundnut oil was analyzed for aflatoxin B_1 by using the standard procedure (AOAC, 1984) and spiked with a known amount of the aflatoxin B_1 standard. The rate of filtration of the unrefined groundnut oil along with various adsor-

Table 1. Rate of Filtration at Different Levels of Aluminium Silicate Clays

Name of clay	Level of clay %	Filtration time (sec.)	Rate of filtration (ml/sec.)
Fuller's earth	1	75	1.3
	3	150	0.7
Kaolin	1	60	1.7
	3	420	0.2
Ball clay Grade I	1	90	1.1
	3	240	0.4
Ball clay Grade II	1	90	1.1
	3	240	0.4
Kaolin C	1	30	3.3
	3	120	0.8
Kaolin S	1	25	4.0
	3	90	1.1

bents was determined using the following formula.

$$\text{Rate of filtration} = \frac{\text{Volume of filtrate}}{\text{Time of filtration}}$$

The time of filtration was measured by using a stop watch. The rate of filtration was checked at different levels (1% and 3%) of different adsorbents.

Results and Discussion

The spiked oil samples contained 100 ppb of aflatoxin B_1. The oil samples (100 ml) were mixed with different levels of clay 1% and 3% mixed for 1 minute and incubated for 15 minutes at 65^0C and filtered through the funnel under vacuum. Earlier reports (Waghray, 1991) indicated that maximum aflatoxin B_1 decontamination was observed when 1% and 3% of clay concentrations were used. At each concentration of the clay, the filtration time was noted and rate of filtration calculated (Table 1). The filtration rate varied between 4 ml/sec to 0.4 ml/sec except kaolinite at 3% level, where it was 0.2 ml/sec compared to 0.02 ml/sec with the conventional buchner funnel. Another advantage of this apparatus was that there was no residual of clay in the filtered oil.

In view of the advantages cited in this paper the modified buchner funnel may be useful in increasing the filtration rate of oil.

Acknowledgement

The first author wishes to thank the Andhra Pradesh Agricultural University for the award of State Stipend during the course of study.

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Importance of Bar Coding

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Bar coding is a system developed to assign a unique number to any product or service in existence, being produced or to be produced. It is a system designed to identify products during its journey starting from the point of manufacture through storage, distribution to ultimate use or consumption.

Bar coding comprises in developing a unique code number in the form of bars and spaces for each product for its identification and processing during distribution. This code of bars and spaces is unique for every product, and appears on a small area of the wrapper or a package used for containing the product. While this code itself does not signify anything to common man, it can only be read by special devices developed for the purpose, known as bar code reader or scanner, which are linked to a computer.

In most of the countries abroad, use of such automatic devices for product identification and transactions, thereafter, such as billing is a normal practice. If products going to overseas markets do not bear bar code, it will not only create difficulty during its handling but may not be accepted by the trade. Most of the retail outlets use cash registers which are linked to the computer which automatically keep inventory control of the stock. Everytime, an item is sold, that quantity is deducted from the stock and at the end of the day, organization can get a clear picture about the quantity of the particular products available for the next day.

The advantage to the exporters is of special significance both from the point of convenience as well as its impact on marketability of the goods and hence the foreign exchange earnings and the profits.

Bar coding is a system developed to assign a unique number to any product or service in existence, being produced or to be produced.

Benefits to Manufacturers

The salient features and advantages are i) Easy availability of sales information to schedule production and stock levels and minimizing stock out risks. ii) Accurate and fast assessment of the product acceptance/failure. iii) Control tool for internal operations, inventory and warehouse management, etc. and iv) To be in tune with the overseas market already with computerized system

Benefits to Retailers

i) Better inventory control system ii) Easy reordering of the goods and avoidance of stock out situation and iii) Eliminating errors on pricing, quantity levels, etc.

Benefits to Consumers

i) Receipt of right products and pricing and ii) Avoidance of human errors.

Advantages at Export Front

The advantages the exporters can derive are of special significance. As many countries have already switched over their transaction in business and trade with the help of this automatic identification system, it is easier for them (importers, distributors, retailers etc.) to handle and trade with items which are bar coded. For

* *Joint Director*

instance, in a huge departmental store, selling thousands of different products obtained from different sources of supply all over the world, it is possible to monitor the stock levels of each item available for sale at any moment of time at the press of a button. This helps them to send the requisition for replenishment immediately to the sources of supply. Thus, they are able to keep the minimum inventory without running the risk of stock outs.

Absence of Bar Code - Implications

In the absence of bar code, the departmental stores/product receiver/user will have to physically monitor the stock levels which is difficult in view of the high labour cost. Another difficulty, they may face, is in revising the price of the products in case of changes in the levies, duties or for other reasons. If the products are bar coded, they can do it at press of a button. However, if the products do not bear bar codes, they will have to do it manually. Tendency on the part of the importers, distributors and retailers will be to avoid using products, which are not bar coded, particularly when all their management, and link system are streamlined and tuned to bar code system. Supermarkets, departmental stores chain and practically all retail outlets are equipped with systems and mechanisms to suit only bar coded packages/labelled items. Thus, the export market will be extremely reluctant to entertain packaged/labelled products without bar coding.

Important Steps to Bar Code Products

First, it is necessary to obtain a company code (unique for every organization in the country) from the national numbering organization (NNO). The NNO, in turn, obtains its own code from the International agency such as International Article Numbering Association

Bar coding comprises in developing a unique code number in the form of bars and spaces for each product for its identification and processing during distribution.

(EAN). While the NNO (only one for each country) has a unique 2 or 3 digit code, it allocates another 4 or 5 digit code to each of its member organizations within the country. Each organization, in turn, allocates 5 digit number to each of its products or services. Thus, there are total 12 digits which make a bar code but there is one more additional digit called a check digit, which completes a bar code number for the given product. These numbers are unique for every product.

There are norms prescribed regarding the operation of the bar code system, including the size of bar codes to be used on different packages, colour combination, and other requirements.

This numbering system is under EAN 13 digit code. There is another EAN 8 digit code. In addition, there are other types of bar code systems also, available for special applications. EAN bar codes are acceptable internationally and are compatible with most of the equipments used for scanning and information processing. However, USA, and Canada have universal product code (UPC) system and some of the equipments in these countries may not be compatible with EAN bar codes.

Bar Code Printing

Bar code labels can be produced in-house or can be obtained from bar code label supplier. This bar code can also be printed on the wrappers, cartons, and other types of packages with the help of a film master. The film master is a negative with bar code symbol on it being required by the printer to incorporate on the printing plate as part of the total label design or graphic on the package.

There are norms prescribed regarding the operation of the bar code system, including the size of bar codes to be used on different packages, colour combination, and other requirements.

It is necessary to bring in standardization of bar codes to make it readable by the common scanners and processing equipments used and to ensure correct reading of the bar code at first instance every time by the scanner.

Current Status in India

Though the importance of bar code system is appreciated by the trade and industry, the system has not yet come in India in the real sense. The IIP has taken the initiative to introduce the concept within the country,

pursuing the subject at the highest level with the Government of India and apex bodies of trade and industry.

As a result of collective efforts, a separate body with the name of EAN-India is being set up which will be responsible for allocating company codes to organizations in India interested in introducing bar coding. These code numbers allocated by EAN-India will follow bar code symbology and system administrated by EAN International. EAN-India has recently taken up the membership of EAN International and will soon commence its activities of allocating internationally valid code numbers.

The infrastructure set up at EAN-India will also assist in the industries, within the country, for introducing the concept and the system in their operations. EAN-India will operate from the premises of Indian Institute of Packaging located in MIDC Area, Andheri (E), Mumbai.

At present, there are few organizations in the country who are providing bar code labels, printers, scanners, and other accessories from the imported kit.

At present, there are few organizations in the country who are providing bar code labels, printers, scanners, and other accessories from the imported kit. Though some of the organizations within the country have started using bar codes, these are more for their in-house use and inventory management.

The full scale use of bar codes is now possible with setting up of the EAN-India with necessary infrastructural facilities.

Tea : A Refreshing Beverage ..... *Continued from page 29*

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Facts About
Codex Alimentarius Commission (CAC)

What is Codex Alimentarius ?

The term "Codex Alimentarius" is taken from the Latin language. It means "food code". The Codex Alimentarius is a collection of international standards for the safety and quality of food as well as codes of good manufacturing practice and other guidelines to protect the health of the consumer and remove unfair practices in international trade.

In 1962, the Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization (WHO), a world wide conference called on food standards and guidelines that would protect consumer's health and ensure international fair trade practices. As a result of that conference, the Codex Alimentarius Commission (CAC) was formed.

How does Codex operate ?

It has 151 countries as on March 1995 (nations that belong to FAO or WHO) and meets every other year alternating between Rome and Geneva.

The Executive Committee manages the CAC's programme of work and makes recommendations on policy and other issues for approval by CAC.

The Secretariat is located in FAO, Food Quality and Standards Service, Food and Nutrition Division. It provides staff support for CAC.

It has 237 standards including general standards and standards for specific foods; numerous other codes and guidelines.

What is the role of government ?

Serve as clearing house for providing about Codex activities to other government organisations, academia, industry and consumers.

Participate in the development of standards and other related issues.

Circulate proposed documents to the appropriate organisations for review and comment.

Assemble responses and submit, by specified date, to the Codex Secretariat for consideration and inclusion in the development of standards and other issues.

Ensure conformance to national standards and codes based on Codex standards.

What is industry's role ?

Participate in the development of food standards.

Review draft standards before adoption by the CAC.

Comply with Codex and national standards in the manufacture, labelling, processing and shipment of food products.

What is the role of consumers ?

Consumer organizations participate in the review of draft standards that are not clear or address the needs of consumers.

How can consumers strengthen their role ?

Understand "Consumer's rights" to participate in the process of developing standards.

Become more aware of and informed about how food standards are developed.

Increase their knowledge about the importance and practice of food hygiene in the marketplace and in the home.

Increase participation in organizations that represent the views of consumers and disseminate information to the general public.

Make responsible choices in the marketplace.

General Food Hygiene

Codex proposals to governments, industry and the consumer on safe food handling

Food Hygiene is vital to avoid food-borne illnesses. When people become ill from eating unsafe food, there can be serious economic consequences for themselves, their families and even the nation. And people have the right to expect that the food they eat will be safe and suitable for consumption.

International trade in food, foreign travel and a change in eating habits makes the spread of illness around the world much easier. New food production, packaging, and distribution techniques can also contribute to the spread of food-borne illness. Therefore, farmers/growers, manufacturers, processors, food handlers and consumers, all have a responsibility to protect the safety of food.

The *Codex Alimentarius*

Food Hygiene codes identify the essential principles of food hygiene throughout the food chain from farm to plate. They ensure that food is safe and suitable for human consumption; that food is wholesome, and free from adulteration. These codes focus on attributes of food hygiene that have universal application. They also give advice on hygiene practices for foods that pose special problems.

Governments are responsible for implementing and enforcing the Codex principles for Food Hygiene. However, because of consumer habits, customs, beliefs or political systems, some member countries may not formally accept Codex standards. If a Member government cannot accept a standard, it should notify Codex "in what ways it's present or proposed requirements differ, and, if possible the reasons for these differences."

Industry is responsible for applying these practices by providing food that is safe and suitable for consumption. It must ensure that consumers have clear and easily understood information by way of labelling and instructions, to protect their food from contamination and growth/survival of food-borne pathogens.

It is essential that *Consumers* understand the importance of storage information on food products, especially how to use the "Best before" dates and the manufacturer's advice on how the food should be kept. Good product information helps consumers to handle food properly in the home and during preparation, serving and storage. Information and education assist consumers in making informed choices and enhance the practice of food safety in the home.

(Reference : "General Principles of Food Hygiene" - A draft revision of the Codex Alimentarius Recommended International Code of Hygiene Practice, FAO/WHO, Rome, 1995)

General Guidelines for Use of Health and Nutrition Claims

The Codex Committee on Food Labelling is presently considering the proposed draft Guidelines for Use of Health and Nutrition Claims. Governments, industries and consumers who would like to review these proposed guidelines should contact their local Codex Contact Point.

Issues that are being considered will have a major impact on consumers. Local governments, industries and consumer organizations should provide their constituents with information to explain the guidelines, definitions, and on how to read and use labels. They must also explain as to what the impact food labelling will have on consumers' ability to make informed choices.

In addition to advice on health and nutrition claims, some of the other issues that are being discussed by the Committee on Food Labelling include :

* Production, Processing, Labelling and Marketing of Organically Produced Foods

* Use of the term "Natural"

* Labelling of Potential Allergens

* Implications of Biotechnology for Food Labelling

* Labelling of Foods with regard to religious requirements - Proposed draft guidelines for use of term 'Halal'

The next meeting of the Codex Committee on Food Labelling (24th Session) is tentatively scheduled for May 1996 in Ottawa, Canada.

Guidelines for the Exchange of Information in Food Control Emergency Situations

Draft Guidelines for the Exchange of Information in Food Control Emergency Situations have been proposed by the Codex Committee on Food Import and Export Inspection and Certification Systems. They contain instructions to governments on actions to be taken when consumers are threatened by a food safety emergency.

Food control emergency situations are those where there is a clearly identified risk of serious unfavourable health effects associated with the consumption of certain foods. In most cases, the authorities know the nature of the agent causing such health effects (e.g. an identified microbiological or chemical agent).

According to the Guidelines, food control authorities in exporting countries should promptly report a food emergency situation to authorities in other countries that have imported the foods or which are the destinations of the foods. Phone, fax or telex should be used to speed the exchange of information.

Some other important instructions in the guidelines are listed below :

* *The nature of the health hazard* - Describe the nature of the health clearly and briefly. Report any association between eating a food and the appearance of a serious health effect, even if the agent causing the effect has not been identified.

* *Food(s) concerned* - Identify in detail the food, food(s) or categories of foods associated with the health hazard.

* *Action taken* - Report any action taken to reduce and

eliminate the hazard. Report measures taken to identify and prevent the sale of food. Also report measures taken to prevent further problems. Identify which agencies are responsible for supervising recall from the market detaining the product and supervising its final disposition.

* *Contact point for further information* - Keep countries that have received the affected food informed of action taken. Provide the name, address, telephone number of persons or organizations who can give further details about the situation.

Note : These guidelines are primarily intended for information exchange between importing and exporting countries. Copies of summaries of selected information should be made available to other international organizations, upon request, to assist in international food control emergency situations.

(Reference : ALINORM 95/30A, Appendix III : Submitted to the 21st Session of the Codex Alimentarius Commission, July 1995 for adoption.)

Fact Sheet

Codex Alimentarius Commission, the World Trade Organisation (WTO) and Sanitary and Phytosanitary (SPS) Measures

What is the SPS Agreement ?

The SPS Agreement is an agreement between nations agreed not to use Sanitary and Phytosanitary (SPS) measures as artificial or unjustified barriers to food trade. Sanitary (human and animal health) and phytosanitary (plant health) measures are needed to ensure that food is safe and that pests or diseases of animals and plants are not introduced into their countries. The SPS Agreement confirms the right of nations to establish and use these measures to protect the consumers, their livestock and wildlife, and their plants including important food crops. The SPS Agreement uses Codex Alimentarius Commission standards as a basis for decisions to be made in regard to food safety.

How can SPS measures restrict trade ?

SPS measures can be arbitrary and can be established not in the interests of consumers, but as protectionist measures for national producers and industries. The SPS Agreement brings the objective of these measures down to the baseline : Do they protect consumers; or do they exist only to protect producer's interests and the food industry ?

What about Safety ?

The SPS Agreement is clear : SPS measures are fully justified to protect consusmers' health and safety, but they must not arbitrarily or unjustifiably discriminate between nations in favour of national producers or industries. They must not constitute a disguised restriction on trade or be more restrictive to trade than is necessary for consumer protection. Governments are required to notify other countries of their SPS requirements and maintain them in an open and transparent manner.

Also, national SPS measures must conform to standards established by an international standard setting organization. Therefore, Codex ensures member nations that SPS measures are necessary for the protection of human health and are clearly identified from measures that are based on non-protective quality, including safety measures.

What about Quality, Labelling and other important Consumer Matters ?

Any standard not directed for consumer health protection (e.g., general labelling information) is covered by the Agreement on Technical Barriers to Trade (TBT) which also recommends the use of Codex Standards. Codex Standards are reviewed frequently to ensure that SPS and TBT measures are based on up-to-date scientific data.

How to get more information and publications about Codex :

For information about activities contact :
Secretariat of the Joint FAO/WHO Food Standards Programme
Food and Agriculture Organization of the United Nations
Viale delle Terme di Carcalla
00100 Rome, Italy
Telephone : (39-6) 5225.1
Telefax : (39-6) 5225.3152/5225.4593
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To obtain publications, contact any world-wide Sales Agent of FAO or write to :

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Alpha Process Engineers

312/2/5 Nehru Nagar, Kottivakkam

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Madras - 600 041

High Precision Digital Temperature Indicator

Ametek (Jofra Instruments), Denmark, has introduced a higher precision digital temperature indicator, which is a highly accurate (0.014^0C) and extremely stable (0.004^0C) instrument designed for carrying out quick reference temperature measurements. The digital temperature indicator is available in two versions, DTI 100 and DTI 1000 with resolutions of 0.01^0C and 0.001^0C, respectively. It provides features such as data logging, calibration of sensors, read out in deg C, deg F, K as well as in true ohm values, within the temperature range - 200^0C to 750^0C. It has two measuring channels giving DT plus two different temperature readings, including high and low peaks. Further to measurements carried out in laboratory, the DTI is very suitable for on-site use.

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AG Engineers offers grate magnets which are used for separating ferrous particles. The round and rectangular magnets are designed such that no ferrous particle can escape without coming in contact with the magnets. Two or more rows are used according to the fineness of the magnetic particle. The assembly of magnets allows easy inspection and clearing and can be used for dry and wet materials where other types of separators cannot be used. They find applications in industries such as plastics, food, drugs, chemicals, etc.

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Techno Force's Agitated Thin-Film Evaporator (ATFE) is suitable for carrying out concentration, distillation or stripping of heat-sensitive or viscous products under controlled conditions. The ATFE can operate under high vacuum up to 1 mm Hg abs and can handle product viscosities exceeding 50,000 cps. The processing is completed in a single pass with an average residence time of 5-20 sec. The all-metal high-speed rotor ensures efficient operation and large throughputs. Special designs with internal condenser for extremely high vacuum applications like molecular distillation (up to 0.001 mm Hg abs.) can be supplied. For large throughputs and dilute feeds, the conventional rising film, falling film or forced circulation evaporators can be supplied in single- or multiple-effect arrangement for preconcentration along with the ATFE as a finisher. Applications are in the food industry, pharmaceuticals, fatty acids, pesticides, gelatins, plasticisers, ploymers, resins, latexes, etc. A pilot plant unit is available for checking process feasibility.

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Filtromix manufactures this versatile equipment, which can be used for mixing, granulating, drying and various other applications. The equipment can be used with volumetric filling ratios of 30% to 70%. It does better and efficient mixing, when compared with conventional mixers like ribbon, paddle, tumbler, etc., with minimum residence time. The mixing elements are arranged in a special geometric sequence so as to prevent formation of static zone inside the mixer. The mixing elements cause axial and radial product movements. The product discharge takes place through a specially designed pneumatic/hydraulic opening and closing arrangement at the bottom. Formation of agglomerates is possible in case of solid liquid mixing. High speed choppers can be provided to break lumps into evenly sized particles. The control panel is provided with air/nitrogen purging to prevent external dusting. The equipment can be used in industries like detergent, paint and pigment. Cocoa and Sweetmeat, industrial brake lining and gasket, flyash, fertiliser, cosmetic, cattle feed and foodstuff.

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Reimelt offers a high capacity pneumatic-blender for gentle blending of fluidisable ingredients of similar consistency. Application is as blender for all dry ingredients in the food, pharmaceutical and chemical industries; as weighing unit mounted on load cells with connections to electronic control centre in fully automated production process (filling, mixing and discharge); and as pressure vessel (up to 4 bar absolute pressure-tight) for pneumatic conveying for high capacities and long distances. Special designs available are : liquid spray-in nozzles for liquids and fats, spray-head for wet cleaning, lump breaking device, cooling and heating of products, air purge for complete discharge, load cells for electronic weighing with data registration, tandem arrangements for double capacity. Advantages of pneumatic blending are : extremely short mixing cycle; elimination of any mechanical stress against the product through agitation results in gentle mixing; clean mixing vessel, easy sanitation; conveying and blending media is the same; excellent heat transfer through intense turbulence during mixing; start/stop of mixing process is in seconds; minimal maintenance and inspection costs due to non-existence of mechanical devices; feeding and discharge time extremely short; extremely high integration possibilities; and universal application.

For details write to :

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6 Prachi, Off Bhandarkar Road,
913 Deccan Gymkhana

Pune - 411 004 Maharashtra

Tel/Fax (0212) 352451

Utensil and Dish Washers for Kitchens

JEROS Denmark, one of the leading manufacturers in Europe, offers for use in hotels and industrial kitchens : automatic utensil washers in stainless steel, having high quality, user friendly construction, reliability of operation, efficient disinfection and good drying effect.

A built-in operating programme with flush hose makes it possible for washing up water to be reused for cleaning at the end of a working day, thanks to ongoing replacement of washing-up water.

Identifying features of JEROS utensil washers are :

- Fully automatic soap and rinse aid dosage
- Mixer with quick coupling
- Rinse pump - ensures min. 82^0C hot water during the entire rinse period
- Flush hose with quick coupling
- Variable wash-time from 0.5 to 12 mins.
- Independence of water pressure
- Three cleaning problems solved in one and the same machine
- Ergonomically correct lid function (operable from three angles)
- Previous wash area can be replaced
- Easy to clean.

Washers are available in various models with wash areas of W x D = 690 x 550, 810 x 550, and 1010 x 700 mm.

The recently introduced JEROS Combi Dish and Utensil Washer Model 8000 with wash area 430 x 690 diameter uses only 5 litres of water per wash.

JEROS also offers tray cleaners (trays with two edges only) with auto oiling for Bakery Ovens - Models 5011 and 5015.

For details contact :
Tricon
5A Mayur, 771 Deccan Gymkhana
Pune - 411 004
Tel./Fax : (0212) 352451

Praj Brings the Packo Range of Dairy Technology

Recently, Praj entered into an arrangement with PACKO, Belgium, which will provide Indian dairy industry with state-of-the-art technology for maintaining high quality right from milking.

The agreement with PACKO will result in a range of solutions for the dairy industry, including :

* Various types of milking machines - bucket milking, herring - bone type, auto tandem or pipe-line milking for various animals.

* Milk cooling machines - open and closed type milk cooling tanks with ice-bank or direct expansion systems for ensuring good quality of milk (i.e., low bacterial contamination).

For details contact :
Praj Industries Ltd.
1216/6, Fergusson College Road
P.O. Box No. 831
Pune - 110 004

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RESEARCH ROUND-UP

Tailored Film Laminates for Modified Atmosphere Packaging of Fresh Fruits and Vegetables

Modified Atmosphere (MA) packaging enhances shelf-life of fresh fruits and vegetables. In a Modified Atmosphere Package (MAP), due to respiration of the packaged commodity and selective gas permeation through packaging film, the package air composition gets modified automatically. However, it is important that the package be able to self-establish recommended air composition as quickly as possible. For this purpose, proper designing of MAP is essential. It involves mathematical modelling of gaseous exchange between the package and the ambient atmosphere. The model is used for optimizing various package parameters and determining gas transmission requirements (GTR) of the package. Though, the GTR of MAP vary with the commodity as well as the package dimensions, they need to be met as precisely as possible.

The gas transmission characteristics (GTC) of most of the commercially available films as well as film laminates do not match with the GTR of MAP. In fact, the GTC of films, particularly the transmission rates of O_2 and CO_2 as well as their ratio impose severe limitations in MAP design. In order to overcome these limitations, Dr. Matthew Prasad of S.K. University of Agricultural Sciences and Technology, RARS, R.S. Pora, Jammu - 181 102 and Dr. R.P. Singh of Materials Science Centre, I.I.T. Kharagpur - 721 302 have developed a novel method of tailoring plastics film laminates. In this method, two or more different films are combined to form the laminate. By tailoring the laminate, the surface area of each film is optimized to bring the GTC of the laminate as close to the GTR of MAP as practical.

Experimental studies have demonstrated that the packages made of specially tailored plastics film laminates could self-establish the recommended composition of package air within the stipulated time. In case of apples, the shelf-life of MA packaged apples was found to have increased by 1.45 to 2.25 times between 7 and 21 ^{0}C, whereas the economic increased by 1.2 to 1.5 times.

The Scientists have also developed a computer-aided design module for systematic designing of MAP. By employing the tailoring technique, a wide variety of commercially available films can be used to develop the laminates for MA packaging of various types of fruits and vegetables.

Bio-sweets from Coconut Water

Coconut water can be used to prepare bio-sweets - 'bio-halva' or 'bio-burfi'. These sweets can be made with the help of a bacterium biosynthesizing the pure cellulose grown in coconut water. Dr. S. V. Hegde, Professor, University of Agricultural Sciences, Bangalore, who developed the technology for preparing this bio-confection, said that the bacterium was selected after extensive screening.

It was chosen to produce a polysaccharide gel of proper consistency, texture, water-holding capacity and layer-forming characteristics from among the naturally occurring acetobactors in fruits, honey and flowers.

The bacterium, when grown in coconut water with 10-15 per cent sugar, forms a translucent white, gelatinous, insoluble, thick gummy layer on surface of liquid in about two weeks' time. The jelly layer is removed, washed free of excess acid and candied by boiling in sugar syrup, to produce 'bio-halva' which resembles western gum drops and natade-coco of the Philippines in texture and flavour.

The bio-halva can be prepared with sugarcane juice, pineapple juice, banana juice or mango juice by growing the same bacterium. Hygienically prepared and canned or packed like chocolates, it is intended for long shelf-life without any addition of preservatives.

Being a major coconut producing country, thousands of litres of coconut water can be profitably used to produce bacterial cellulose as well as acetic acid.

DATA BANK

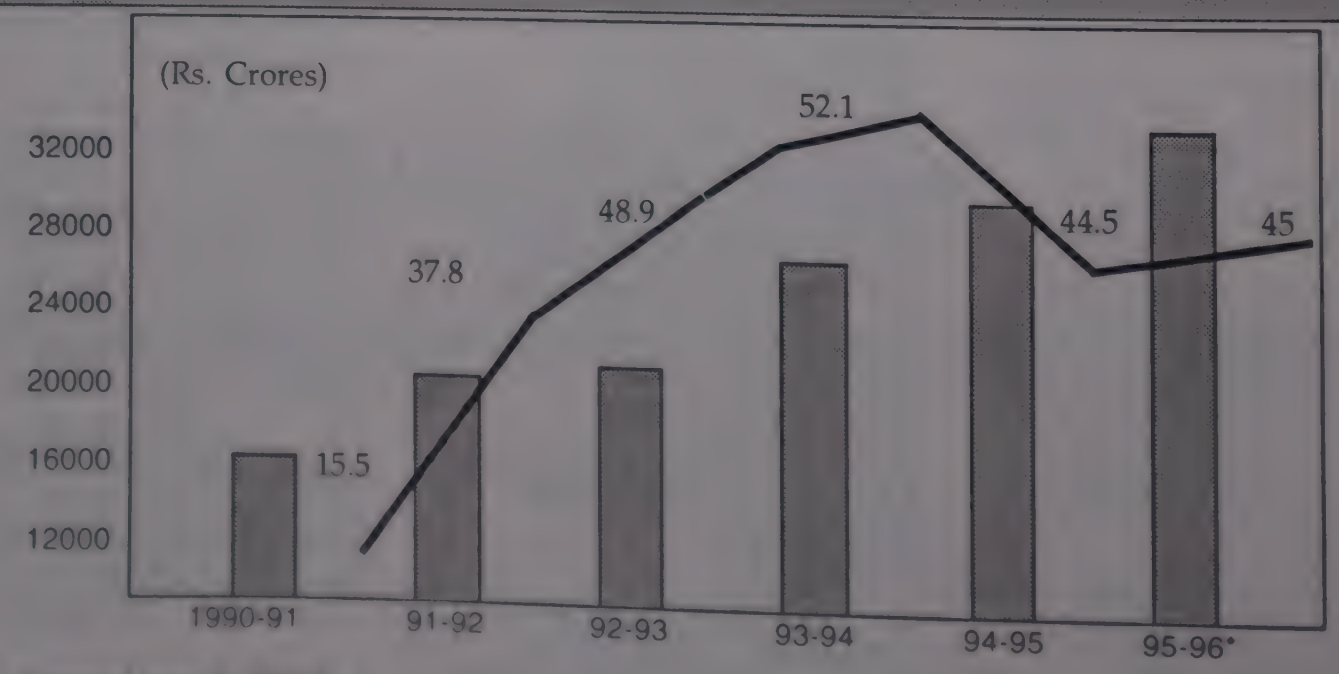
India's Share in World Livestock Population

Category	Unit	1975-77 (Average) World	1975-77 (Average) India	1975-77 (Average) India's Share (%)	1990 World	1990 India	1990 India's Share (%)	1995 * World	1995 * India	1995 * India's Share (%)
Bovine animals	Million heads	1312.95	240.99	18.4	1426.32	272.36	19.1	1483.37	285.98	19.3
Sheep & lambs	Million heads	1046.44	40.72	3.9	1206.26	54.59	4.5	1266.57	57.32	4.5
Goats & lambs	Million heads	427.27	74.04	17.3	569.72	110.00	19.3	640.93	121.00	18.9
Bovine hides & skins (raw)	Million pieces	272.40	32.70	12.0	288.00	40.50	14.1	295.20	41.31	14.0
Sheep & lambs skins (raw)	Million pieces	407.40	19.40	4.8	495.90	26.60	5.4	538.05	29.59	5.5
Goats & lambs skins (raw)	Million pieces	159.70	38.50	24.1	236.50	50.00	21.1	271.97	52.50	19.3
Heavy leather (Bovine animals)	000 tonnes	496.00	38.70	7.8	420.50	49.20	11.7	399.48	52.46	13.1
Light leather (Bovine animals)	Million Sq. ft	7581.50	531.50	7.0	10143.60	663.80	6.5	11360.88	667.12	5.9
Light leather (Sheep & goats)	Million Sq. ft	2925.30	410.30	14.0	3863.70	1487.20	12.6	4346.66	516.43	11.9

* Estimated broadly on the basis of average annual growth trend during the eighties

Source : Up to 1990, National Leather Development Programme

Turmeric Exports



Estimated target for 1995-96

Import of Chillies / Capsicum by USA

Source of Origin	1992		1993		1994	
	Qty (M.T)	% Share	Qty (M.T)	% Share	Qty (M.T)	% Share
China	1649	11	3127	21	5111	33
India	5404	36	5972	40	4247	28
Chile	1439	10	1409	10	1291	8
Mexico	1617	11	2010	14	1646	11
Pakistan	3670	24	141	1	486	3
Others	1271	8	2142	14	2527	17
Total	**15050**		**14801**		**15308**	

Import of Chillies / Capsicum (ground)

Source of Origin	1992		1993		1994	
	Qty (M.T)	% Share	Qty (M.T)	% Share	Qty (M.T)	% Share
China	345	3	610	8	708	11
Mexico	5211	48	4550	60	2573	41
Pakistan	1768	17	228	3	922	15
Costa Rica	2170	20	968	13	977	16
Hong Kong	699	7	586	7	436	7
Others	498	5	674	9	677	10
Total :	**10691**		**7616**		**6293**	

Some Top Industries Ranked by Advertisement and Publicity Expenses

Industry	Adv. Exp 1994-95	% Chg	Adv. Exp as % of Gr Sales	Adv. Exp as % of other expenses
Domestic appliances	136	80.9	2.0	18.1
Food Products	89	12.4	3.5	19.6
Tea / Plantations	88	14.9	2.6	14.5
Breweries/Distilleries	73	42.1	2.9	13.7
Pesticides/Agrochem	20	1.9	0.9	5.9
Solvent extraction	6	48.2	0.1	0.9
Packaging/Metals	1	250.0	0.1	0.5
Sugar	1	56.6	0.0	0.5

Figures rounded off to the nearest crore
Source : Business Standard

DATA BANK

Major Exporters for Fruit and Vegetable Juices 1990-94

US$ million

Exporting country	1990		1992	1994	
	Value	% of world total	Value	Value	% of world total
Brazil	1,502.67	34.5	1,100.06	1,019.38	22.3
Netherlands	252.05	5.8	294.65	543.90	11.9
United States	375.50	8.6	461.02	534.65	11.7
Germany	372.29	8.5	390.88	457.48	10.0
Italy	224.94	5.2	277.74	251.69	5.5
Spain	87.29	2.0	133.14	152.28	3.3
Austria	97.11	2.2	85.85	120.86	2.6
Belgium-Luxembourg	119.77	2.7	129.42	117.17	2.6
Israel	245.94	5.6	154.65	107.02	2.3
Thailand	70.92	1.6	100.67	105.64	2.3
Poland	63.24	1.5	90.22	97.52	2.1
France	80.38	1.8	99.18	84.48	1.9
Argentina	126.86	2.9	197.84	83.13	1.8
Mexico	109.22	2.5	35.68	82.49	1.8
South Africa	40.24	0.9	75.28	65.48	1.4
Australia	18.40	0.4	28.00	55.90	1.2
Hungary	47.83	1.1	48.46	53.85	1.2
Chile	26.22	0.6	76.56	47.04	1.0
Philippines	38.26	0.9	40.00	39.08	0.9
United Kingdom	26.91	0.6	35.55	38.01	0.8
Turkey	25.63	0.6	35.90	36.54	0.8

Based on world imports by origin.

Source : UNSO/ITC Comtrade Data System.

PEOPLE

Anuradha Desai, has taken over the reins of the Rs. 325 crore Venkateshwara Hatcheries (VH) group succeeding her late father Shri B.V. Rao who was the doyen of the poultry industry in India.

TRADE FAIRS & GET-TOGETHERS

Following is the list of Trade Fairs scheduled to be held from June 1996 to December 1996 on (i) Food, beverages and catering and (ii) Packaging materials, packaging machinery and material handling/storage.

(i) Food storage, Beverages and Catering

June 3 to June 7	SIAL BOISSOMS Int'l Beverage Exhibition Paris, France	SIAL, 39, rue de la Bienfaisance 75008, Paris, France Fax : 33-1 4289-4694
June 15 - June 19	ICTF Int'l Catering Trade Fair, Sydney	BPI Exhibitions (P) Ltd. 11-5 Railway Street, Chatswood, NSW 2067, Australia Fax : 61-2419-7399
June 14 - July 17	FOODPRO Int'l Food Processing Exhibition Sydney. Australia	Riddell Exhibition Promotion (P) Ltd 135/141, Burnley Street Richmond, Victoria 3121, Australia Fax : 61-3427-0829
August 22 - August 26	Food Expo Hong Kong	Hong Kong Trade Development Council, Office Tower 36-39/F, Convention Plaza 1, Harbour Road Hong Kong Fax : 852-2824-0249
September 3 - September 9	FHC Int'l Food, Drink, Super market, Hotel & Catering Equipment & Supplies Exhibition Beijing, China	Hong Kong Exhibition Service Ltd. Uni 902, Shiu Lam Building, 9/F, Luard Road Wanchai, Hong Kong Fax : 852 2528-3103
September 8 - September 11	Fine Food Int'l Fine Food & Drink Exhibition Melbourne, Australia	Australian Exhibition Services (P) Ltd. Illoura Plaza 424, St Kilda Road Melbourne, Victoria 3004, Australia Fax : 613 - 867 - 7981
September 23 - September 25	Food-Nonfood Catering & Restaurant Equipment, Services & Products Trade Fair Rotterdam Netherlands	Ahoy Rotterdam NV., Zuiderpark-weg, 20-30, Rotterdam 3084 BB, The Netherlands Fax : 31-10481-8536
October 20 - October 24	SIAL Int'l Food Products Exhibition Paris, France	SIAL, 39 rue de la Bienfaisance 75008, Paris, France Fax : 33-1 4289-4694

October 21 - October 25	IPA Int'l Food Manufacturing Week, Paris, France	CEP Exposium I, Yue du Pare, F-45590 Saint Cyr en Val, France Fax : 33-3869-0792
October 23 - October 26	Food Tech Int'l Food Engineering & Industry Show Osaka, Japan	Osaka Int'l Trade Fair Commission, 1-5-102, Nanko-Kita Suminoe-Ju, Osaka Japan Fax : 06-612-8585
November 13 - November 19	Equip' Hotel World's Largest Trade Show for Hotels, Cafes & Catering Industries Paris, France	Groupe Blenfeion 70, rue rivay, 92532, Levallois Perret Cedex France Fax : 33-1 4756-1440
November 20 - November 24	BBC Good Food, Cooking & Kitchen Show, Birmingham, U.K.	Consumer Exhibition Ltd 23/24, George Street Richmond Surrey, TW9 1 HY, U.K Fax : 0181-846-9712

(ii) Packaging material, Packaging machinery and material handling / storage

September 2 - September 5	Food Pack Print Food Processing, Packaging & Printing Guangzhou, China	Business & Industrial Trade Fairs Ltd First Pacific Bank centre, 18/F, 51 Gloucester Road, Wanchai, Hong Kong Fax : 852-2866-1770
September 6 - September 9	China Pack Plastics, Packing & Plastics Trade Show Guangzhou, China	Blenheim Group plc. 71/73, Great Portland Street London WIN6JH, UK Fax : 0171-631-1722
September 18- September 22	CIP China Int'l Packaging Technology Exhibition Beijing, China	CIEC Exhibition Co (Hong Kong) Ltd Room 3903, 39/F, China Resources Building 26, Harbour Road Wanchai, Hong Kong Fax : 852-2827-5535
November 12 - November 16	Emballage Int'l Packaging Exhibition Paris, France	CEP Exposium 1, rue du Parc, F--92593, Levallois Perret Cedex, France Fax : 33-1 4737-7447, 4968-5466

TRADE FAIRS & GET-TOGETHERS

December 3 - December 6	Pack Print & Food Processing Yangon, Myanmar	CP Exhibition, 2801, Tung Wai Commercial Building, 109, Gloucester Road, Hong Kong Fax : 852-2511-9692
December 4 - December 7	Propack Int'l Packing & Food Processing & Packing Equipment Exhibition, Beijing, China	Hong Kong Exhibition Service Ltd Uni 902, Shiu Lam Building 9/F, 23, Luard Road Wanchai, Hong Kong Fax : 852-2528-3103

India-Russia Buyer Seller Meet

FIEO, in association with the Chamber of Commerce and Industry of the Russian Federation will be jointly organising an "India- Russia Buyer-Seller Meet" in Moscow as under :

Date : 15-20 July, 1996

Venue : Krasnaya Presnya International Exhibition Centre, Moscow

Rate for 9 sq. mt. : Rs. 1,00,000 or US $ 3500 per stand sq. m for the period

Additional Space : Rs. 11,000 or US $ 350 per sq. m.

Space less than 9 sq. m is also available on sharing basis at US $ 350 per sq. m.

The exhibition will cover a wide range of products, namely Consumer Durables (furnishings, made-ups, carpets, coverings, leather goods and garments, under garments, footwear, wollen wear, cotton textile, readymade garments, leather accessories, shoes etc.), cosmetics and body care, office automation, electrical goods, automobiles, industrial items, food and beverages, and pharmaceuticals and medicines.

Interested parties may contact FIEO, New Delhi for further queries.

(Fax : 91-11-6863087, Telex : 031-73194 FIEO IN, Tel : 6851310)

AWARDS

Shri Sadasivan Nair, a well known Food Technologist of Rajasthan Agricultural University and the President of Jaipur Chapter since 1993 earned the credit to be the first Indian language author of two University level test books, one in Malayalam and another in Hindi, on the subject Fruits and Vegetables Preservation Technology. These books also carry an elaborate forward from Dr. M.S. Swaminathan, an eminent Agricultural Scientist.

For his Hindi Book, he received the prestigious "Rajendra Prasad Award (1st Prize) in 1982 instituted by I.C.A.R. Earlier in 1980, he received the Independent's day award for the invention of Indian Gooseberry (AONLA) prickers for making Aonla Muraba.

He is the first Scientist, in order, to get Rajasthan Agricultural University Merit Award 1987 for his outstanding scientific contribution. It is to be further highlighted that he further modified the Pricker invented by him into table and automatic model with high efficiency.

Shri Sadasivan not only imparted knowledge to the University students but also trained other Indian and Foreign students in fruits and vegetables preservation.

BOOKS

Major Spices of India : Crop Management of Post-harvest Technology by J. S. Pruthi (1993) 1st Edn. Pub. by Indian Council of Agri. Res. (ICAR), New Delhi - 12. pp 1- 514 + (xxii). Well illustrated, Price (Subsidised) = Rs. 200/-

From time immemorial, India has been famous for her quality spices which now earn foreign exchange to the tune of about 6,000 million rupees annually, while the current world spice trade is around 1,500 million US dollars (i.e., 57,500 million rupees). India is one of the largest producers and exporters of quality spices and spice products and has rightly earned the name of "Home of Spices'. But, it is rather surprising that so far, there is not a single book on crop management and post-harvest technology of spices. The ICAR therefore decided to bring out 2 technical monographs on spices and requisitioned the services of Dr. J. S. Pruthi, an eminent Agricultural Scientist and Spice Technologist, to write these 2 monographs entitled (1) Major Spices of India-Crop Management and Post-harvest Technology, (2) Minor Spices and Condiments. Crop Management and Post-harvest Technology. Dr. Pruthi has already authored 3 other technical books on different facets of spices.

The present first comprehensive and authoritative compendium on 'Major Spices' covers 5 most important spices (pepper, cardamom, chillies, ginger and turmeric), which together bring about 75- 87% of the total annual Indian spice export earnings. The book comprises 8 chapters, the first being 'Introductory' covers nomenclature, history, role of ICAR, some CSIR laboratories, other departments and universities engaged in spice-development programmes, present production, export and future plans for spice development. Chapters 2-6 describe one spice each on a common format for all the 5 major spices of India referred to above viz., nomenclature, economic importance, production, export, cultivation or crop management, plant protection, post-harvest technology, warehousing, marketing, processed products and end- uses. Each chapter is supported by comprehensive select bibliography. Chapter 7 deals with Agmark (National) standards for each spice. Besides the ISI and International standards for spices, their methods of test have also been listed. In Chapter 8 are given numerous practical suggestions for future research and development programmes. An update (55pp) on the latest R&D Work on the said 5 major spices has been provided. At the end, 17 annexures containing useful information to the readers/users have been appended. They are followed by index.

It is hoped that this publication which is the first of its kind in India and possibly in Asia, Africa, and Latin America, will be of great practical value to all spice growers, agricultural scientists, technologists, teachers, students of all agricultural universities, entrepreneurs, as well as those engaged in processing, packaging, quality control, standardization and export marketing of spices.

Separation Processes : Principles and Applications : Editors : A Grandison and M.J. Lewis. pp 288. Published by : Woodhead Publishing Limited, Abington Hall, Abington, Cambridge CBI6AH, England. Price : £ 75/- or US $ 135/-

The book consists of 9 chapters the titles of which are given below :

Contents :

1. Separation Processes : An Overview 2. Super Critical Fluid Extraction and its Application in the Food Industry 3. Pressure - Activated Membrane Processes 4. Ultrafiltration 5. Microfiltration 6. Ion-Exchange and Electrodialysis 7. Innovative Separation Methods in Bio-processing 8. Fractionation of Fat 9. Solids Separation Processes

The book reviews the more recent methods and techniques for separating food components and products of the biotechnology industry. Each Chapter deals with a specific type or area of application and includes information on the basic principles involved, industrial equipment available, commercial applications and an overview of current research and development.

The book will be useful for Food Scientists, Biotechnologists, University Research Departments, Research Institutes, Engineers and Technologists involved in the processing of food and production of biochemicals. Advanced students of Food Science, Food Technology, Biotechnology, Chemical Engineering and Applied Biological Sciences.

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